WAGNER-ATLANTA VEGETATION TREATMENT

FINAL ENVIRONMENTAL IMPACT STATEMENT

JUNE 1995

USDA, FOREST SERVICE
Helena National Forest
Townsend Ranger District

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Helena National Forest
Townsend Ranger District
Meagher County, Montana

June, 1995

Responsible Agency	USDA Forest Service
Responsible Official	Thomas J. Clifford, Forest Supervisor Helena National Forest 2880 Skyway Drive Helena, MT 59601
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ABSTRACT

This Final Environmental Impact Statement describes five alternatives for vegetation treatments and road construction in the 36,660 acre Wagner-Atlanta Implementation Area. The Implementation Area is administered by the Townsend Ranger District, Helena National Forest. All alternatives are designed to move forested and grassland vegetation towards the desired conditions consistent with the Helena Forest Plan and further defined in the Big Belts Landscape Analysis. Alternatives were developed to respond to the major issues identified during the scoping process. Alternative A is the Proposed Action and was designed to improve overall forest health and sustainability by a combination of silvicultural treatments and prescribed burning. Alternative B is the No Action Alternative. Alternative C was developed to emphasize creation of additional security area for elk during the hunting season and opportunities for recovery of commercial wood products from forested areas that are showing heavy mortality from insects and diseases. Alternative D was developed to focus vegetative treatments on areas that would maximize monetary returns. Alternative E responds to the issue of minimizing effects to the Camas Creek, Cayuse Mountain, and Irish Gulch Roadless Areas. The alternative was designed to avoid any vegetation treatments or road construction in any of the roadless areas. Alternative F limits treatments to those areas that can be treated without construction of any additional roads. It was developed to respond to those concerns related to the efforts of increased roads in the Implementation Area.

Alternative E is the environmentally preferred alternative because it is believed to provide the best overall balance to the long term needs for vegetation treatment and response to the environmental issues.

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SUMMARY

SUMMARY

INTRODUCTION

The Wagner-Atlanta Implementation Area, located on and administered by the Townsend Ranger District of the Helena National Forest, covers 36,660 acres. About 10,600 acres of private land occurs within the exterior boundaries of the Implementation Area.

Vegetation treatments and associated road construction is proposed. Actions should begin in 1995 and be completed within five to eight years. Six alternatives, including the Proposed Action, are analyzed in detail.

This is a general summary of the Final Environmental Impact Statement (FEIS). The Implementation Area is described, the purpose and need for the proposal are presented, and the issues related to the Proposed Action are discussed. The six alternatives are presented along with the various degrees that they respond to the environmental issues generated by the proposal. The comparison of alternatives discloses the more important environmental consequences.

PROPOSED ACTION

The Helena National Forest proposes to move towards a desired landscape resource condition. The Proposed Action includes a combination of vegetation treatment activities to initiate actions for achieving the desired conditions consistent with the Forest Plan and further defined in the Big Belts Landscape Analysis document.

The Proposed Action includes implementing vegetation restoration practices on nearly 6,300 acres of grassland and forested vegetation on the east side of the Big Belt Mountains on the Townsend Ranger District, Helena National Forest. The proposal also includes combinations of prescribed fire and silvicultural treatments in five watershed complexes within the 36,660 acre Implementation Area. The Implementation Area generally extends from the Rubison Creek drainage to the Atlanta Creek drainage. Map I-1, Vicinity Map, displays the general location of the Implementation Area.

Specific activities include the following:

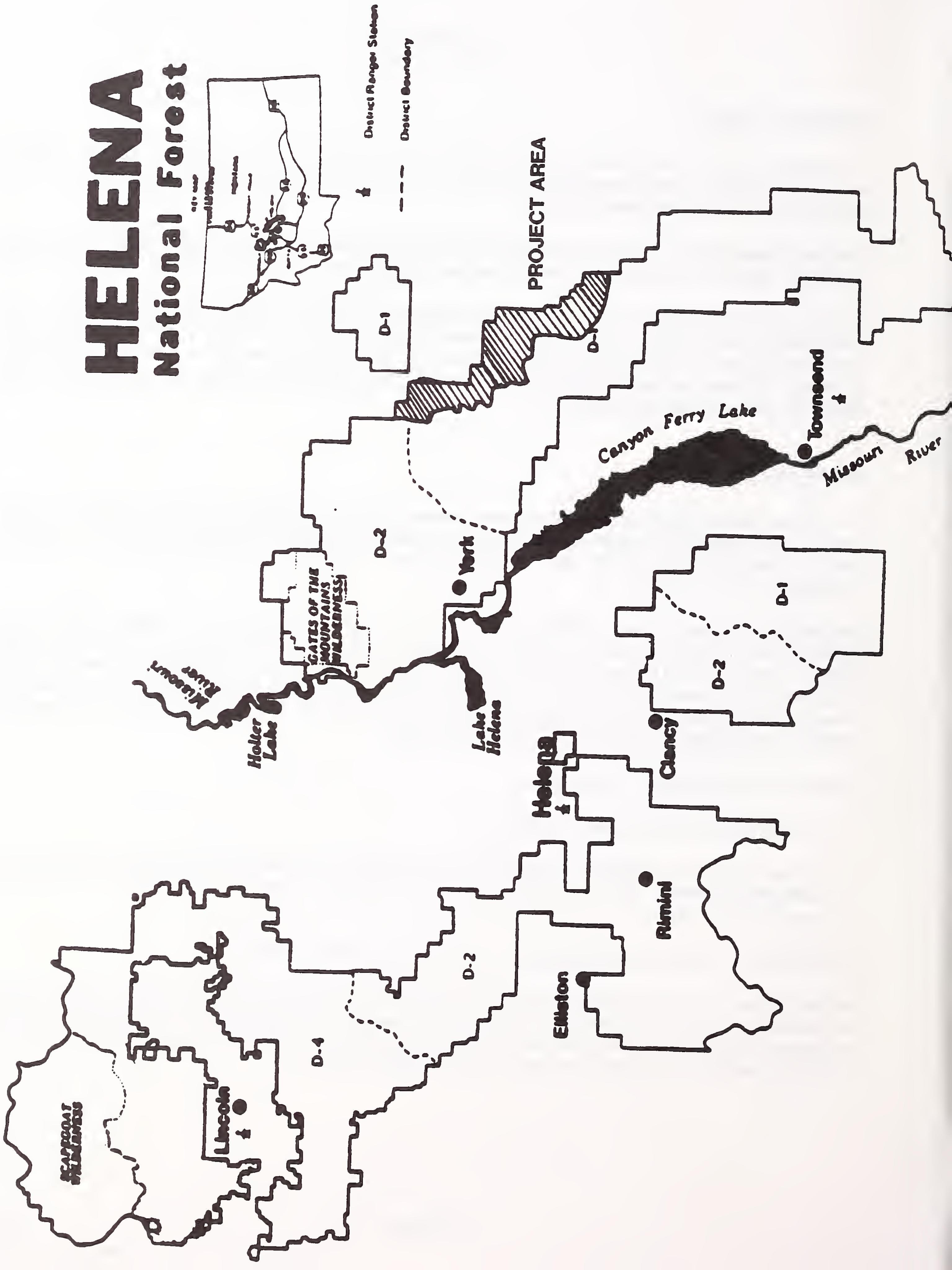
- Prescribe burn 2913 acres of grassland.

- Treat forested vegetation by application of 423 acres of clearcutting with reserves, 821 acres of shelterwood harvest, 899 acres of select harvest, 102 acres of seed tree harvest, and 1141 acres of prescribed burning.

The Alternative A Map shows the location of specific treatments proposed.

Approximately 17.3 miles of temporary road construction and reconstruction of 9.6 miles of existing road will be required to carry out the proposed action. After the vegetative practices are completed these roads will be permanently closed to use by recontouring and revegetating the disturbed areas. An additional 1.8 miles of existing roads within the Implementation Area will also be closed.

MAP 1-1 WAGNER ATLANTA PROJECT AREA VICINITY MAP



United States Department of Agriculture

Forest Service

Helena National Forest
2880 Skyway Drive
Helena, MT 59601

Reply to: 1950

Date: July 20, 1995

Montana Dept. of State Lands
1625 11th Avenue
Helena, MT 59620

Dear Sir:

A copy of the Final Environmental Impact Statement and Record of Decision for the proposed Wagner-Atlanta Vegetation Treatment on the Helena National Forest, Meagher County, Montana, is enclosed.

The responsible official is Forest Supervisor Thomas J. Clifford, Helena National Forest, Helena, Montana.

Sincerely,

THOMAS J. CLIFFORD
Forest Supervisor

Enclosure

Treatments are expected to begin in 1995. The duration of treatments is expected to be five to eight years. No additional entries are planned in the Implementation Area until approximately 2020. Restoration and recovery of sites damaged by fire, insects and/or other unplanned disturbances may be proposed, as needed.

PURPOSE OF AND NEED FOR ACTION

The Proposed Action is designed to respond to the overall guidance (goals, objectives, standards, and Management Area direction) of the Helena National Forest Land and Resource Management Plan (Forest Plan). The Forest Plan and its accompanying Environmental Impact Statement (EIS), to which this document is tiered, are on file and available for review at the Townsend Ranger District Office, the Helena National Forest Supervisor's Office, and the Forest Service Northern Regional Office.

In general terms, the purpose and need for the proposed action is to move towards the desired conditions for nonforested and forested vegetation within the Wagner/Atlanta Implementation Area as identified in the Helena Forest Plan and the Big Belts Landscape Analysis.

Ecosystem management principles are the driving force behind the purpose and need for this action and the foundation of this document. By incorporating ecosystem management principles, the purpose and need was developed to achieve integrated desired conditions that recognize the need to sustain a combination of resources rather than emphasizing only a single resource. Ecosystem management requires a blending of biological, economic, physical and social needs and values to assure the maintenance and sustainability of productive, healthy ecosystems. Resource commodities such as timber, huntable wildlife, recreation opportunities and forage for livestock are suitable outputs of that system.

More specifically, the proposed action has the following purposes:

- To restore and maintain healthy and sustainable grassland ecosystems.

This will be accomplished by restoring site productivity, species composition and diversity, and natural function on approximately 2,900 acres of naturally occurring grasslands through the use of prescribed burning.

Grassland sites historically occupied 30-40 percent of the south and west slopes in the Implementation Area. Under natural conditions, the grasslands were maintained by frequent, low intensity wildfires. Due to the influence of fire suppression activities over most of this century, the natural role of fire has been excluded from most of these sites. Consequently, grasslands have become less productive. Species diversity and palatability and plant vigor have been reduced. Some colonization by Douglas-fir has occurred, thereby reducing grassland areas. Futhermore, savannah grassland habitat types now have a more closed canopy. Grasslands currently occur on only 20-25 percent of the area. The sites proposed for treatment represent those grasslands where stagnation and conifer colonization exhibits the greatest deviation from historical conditions.

- To restore and maintain healthy and sustainable forested ecosystems.

Due to several decades of suppressing natural wildfires, most of the forested stands in the Implementation Area have developed into much denser vegetation than occurred under natural conditions. Eliminating historical, low intensity wildfires (with its associated effects of thinning) has resulted in more densly stocked stands. The excess growth is causing stress to individual plants as they are competing for space, moisture and nutrients. Individual trees and forested stands are more vulnerable to insects and disease once stressed

from overcrowding. Ladder fuels buildup has resulted in the potential change of burn intensity from low intensity underburning to high intensity stand-replacing burns.

In forests which functioned with lethal (stand replacing) fire the biological rotation of the forest was approximately 150 years. That is, forests on the average burned at an intensity which would kill most of the trees at that frequency. These forest types are adapted to this cycle and naturally regenerate following such a process. Such forests are generally upper elevation and occur in cool/moist habitats.

Forests which functioned with non-lethal fire processes were exposed to frequent low intensity fires. These forests underburned every 10 to 30 years, with mature trees adapted to survive these low intensity fires. Eventually, individual trees within these forests die and are replaced by a successor. Mature forests are constant on the landscape and function with individual tree replacement. These forests are generally low elevation and occur in warm/dry habitats.

This project is designed to reenter the implementation area every 25 years for vegetative manipulation. Therefore, forests which functioned with lethal (stand replacement) disturbance processes have 1/6 (25 year entry with 150 year biological rotation) of their acreage proposed for treatment.

Natural processes within forests which were historically subject to frequent non-lethal disturbance processes have been disrupted by many decades of fire control activities and are in greater need of restoration. One half of the acreage of this forest type is proposed for treatment in this analysis.

The overall age structure of forested stands also deviates from the age class distribution representative of natural conditions. The majority (76%) of the stands are in the 100 and 125 year age classes. Age distribution is evenly distributed within the other age classes. The abundance of forest vegetation in the 100 and 125 ages, combined with the unnaturally thick vegetative growth, increases the risk of large catastrophic events (wildfire, insects, disease). Vegetative treatments are needed to create a more natural distribution of age classes and reduce the risk of future catastrophic fires.

RELATIONSHIP TO THE FOREST PLAN

The Helena National Forest began implementation of the Forest Plan in May, 1986. The Forest Plan specifies overall direction under which the Forest will be managed. Specific direction and decisions for individual projects, such as the vegetative treatments proposed for the Wagner-Atlanta area, must be determined following site specific environmental analysis.

The management direction provided in the Forest Plan comprises the framework within which project planning and activities take place. The Forest Plan defines the Management Areas, Goals, and Standards and Guidelines which guided the planning of proposed treatments and associated activities in the Wagner-Atlanta Implementation Area. The Big Belts Landscape Analysis, completed in 1994, further refined the desired conditions that the Proposed Action is designed to achieve.

OVERVIEW OF THE PLANNING AREA

The Implementation Area is located within the Big Belt Mountains. It encompasses approximately 26,000 acres of National Forest land between the Rubison and Atlanta Creek drainages on the east side of the Big Belt Mountains of the Townsend Ranger District, in Meagher County. The Gates of the Mountains Wilderness lies approximately 14 miles north of the Implementation Area. County road 360 accesses the Implementation Area from the east and State Highway 12 runs south of the Implementation Area. The Wagner/Atlanta Implementation Area is approximately 20 air miles northeast of Townsend, Montana, and 28 air miles east of Helena, Montana.

Elevation of the Implementation Area varies from 5,000 feet where Thompson Gulch borders the area to approximately 8,942 feet at Boulder Baldy Mountain. Topography varies from gently rolling mountains at the lower elevations in Wagner and Benton Gulches to slopes exceeding 60 percent at the higher elevations. The majority of the slopes are between 20 and 50 percent.

Annual precipitation of the area generally ranges from 15 inches at lower elevations to more than 30 inches in the Boulder Baldy area. Most precipitation occurs as snow, with deep snowpack accumulating throughout the Implementation Area. The prevailing winds are from the west and are strongest during the summer. Summers are warm in the Helena Valley and much cooler in the surrounding mountains. High intensity thunderstorms of short duration are common during the summer months.

Flora and Fauna

Grasslands/shrublands occupy about 20 percent of the Implementation Area. The remainder is primarily coniferous forest. Deciduous trees in riparian areas, natural openings, and rock outcrops and talus slopes describe the remaining area. Stands of old growth forest are not well represented. No threatened or endangered plants are known to exist in the Implementation Area.

The area supports a variety of nongame wildlife species and large populations of elk and mule deer, with smaller resident populations of whitetail deer, black bear, moose, and mountain lion. Bald eagles are the only threatened or endangered species known to occur in the area. However, habitat is very limited and use by bald eagles is not common.

Cutthroat, eastern brook and rainbow trout occur in the Implementation Area with brook and rainbow trout being the most prominant. Genetically pure westslope cutthroat trout have not been confirmed.

Developed Areas and Human Uses

Development activities, mainly road construction and timber harvest, have occurred regularly in the Implementation Area since about 1960. The alterations created by timber harvest and associated actions are noticeable throughout the area.

Recreation use consists primarily of big game hunting, dispersed camping, snowmobiling, driving for pleasure, and firewood gathering.

Roadless Areas

The Implementation Area includes portions of the Cayuse Mountain, Irish Gulch, and Camas Creek Roadless Areas. These roadless areas comprise approximately 66 percent of the Implementation Area.

ALTERNATIVE DEVELOPMENT PROCESS

Formal scoping for the EIS began with the publication of the Notice of Intent to Prepare an Environmental Impact Statement (NOI) in the Federal Register on July 20, 1993. The NOI presented a summary of the Proposed Action, the purpose and need for the action, tentative environmental issues and other supplementary information. It also expressed the importance of public participation and input, particularly during the initial scoping period and, later, during the period provided for comment on the DEIS.

News releases were printed in three local newspapers during the month of July. They included the Independent Record (July 17, 1993), the Townsend Star (July 15, 1993) and the Meagher County News (July 15, 1993).

Public input was also solicited at three Open Houses. Those attending represented a wide range of interests. Oral and written comments were received both during and after the Open Houses.

All comments received prior to September 9, 1993, were used to identify issues for the DEIS.

Invitations were sent to more than 50 individuals and groups to participate in field trips of the Implementation Area. News releases were also published in the Helena, Townsend, and White Sulphur Springs newspapers to invite interested parties. Public field trips were held on October 5 and November 2, 1994. A total of 16 individuals representing various organizations and agencies participated.

Forty-two responses to the Draft Environmental Impact Statement were received from various organizations, individuals, and agencies. All substantive comments were identified and responses to the comments displayed in Chapter IV. Several changes were made in the FEIS in response to the comments. No new environmental issues were identified from the comments.

Seven significant issues related to the Proposed Action were developed from analysis of the public and internal comments received. Alternatives were developed to respond to each of these issues. The following is a summary of the issues that were identified.

Issue 1: The Effects of Vegetative Treatments and Road Construction on Elk Vulnerability During Hunting Season.

The Montana Department of Fish, Wildlife and Parks and numerous organizations and individuals are concerned with losses of secure habitat for elk populations during the big game hunting season. Loss of hiding cover and ease of access for hunters are the primary components affecting the ability of public lands to hold elk during the hunting period and provide for huntable populations of bull elk throughout the entire hunting season. While providing for secure habitats is the focus of this issue, respondents also expressed concerns for hiding and thermal cover, riparian habitat, travel corridors, avoidance of habitat fragmentation and the construction of new roads.

Issue 2: The Effectiveness of the Proposed Action in Providing Maximum Economic Benefits.

Many individuals are concerned with the economic and social benefits derived from obtaining a continuous supply of timber to support local mills and provide jobs for those employed in the wood products industry. Many of them also recognize and support the financial benefits derived from the revenue that counties receive from timber sale receipts. These people generally favor the maximum sustainable volumes of timber that can be offered. They are also concerned that sale design provides for the most efficient and economical transportation system and harvest methods. Where feasible, they favor sale designs and layout that utilize conventional harvest systems and equipment.

Issue 3: The Effect of Activity on the Roadless and Wilderness Characteristics of the Cayuse, Camas, and Irish Gulch Roadless Areas.

During the scoping process, general statements were expressed opposing any additional road construction, timber harvest, burning or other development activities for the entire Implementation Area, to specific comments relative to avoidance of activities within the Cayuse, Camas and Irish Gulch Roadless Areas.

Specific concerns related to inventoried roadless areas are that timber harvest and road construction would alter the character of these areas to the extent that they would not be favorably considered for future wilderness designation. Many people perceive the areas as remote and void of visual impacts of development and prefer that they remain unchanged. Others are concerned that the security provided for game and nongame wildlife species would be diminished by proposed activities.

Issue 4: The Effect of Building New Roads Within the Implementation Area.

Concerns expressed by many individuals have ranged from generalized statements opposing any additional road construction to statements concluding that the existing number of roads within the Implementation Area are sufficient. These concerns also include the premise that new roads create visual scars upon the landscape.

Issue 5: The Effectiveness of the Proposed Vegetative Treatments in Responding to Forest Health Problems and Sustainability of Ecosystems.

Overall forest health and maintenance of healthy ecosystems is a strong concern of many individuals. Several Forest Service resource specialists identified some different areas that would focus on the recovery and rehabilitation of forested stands exhibiting high levels of recently dead or dying commercial timber or insect and disease activity and timely harvest of stands that are approaching their biological rotation. Additional concerns included maintenance or reestablishment of specialized habitats such as old growth, unique plant communities, linkages and snags.

For the deciduous forest type, grasslands, shrubs, and riparian zones, concerns are based on how to maintain the health and vigor of these communities. Many of these community types are in decline.

Issue 6: The Effects of Applying Ecosystem Management Principles Versus Traditional Forest Service Management Principles to the Implementation Area.

Historically Forest Service timber harvest practices have included openings limited to 40 acres or less with reserve strips interspersed between the harvest areas. Entries within an area were generally in the range of ten year intervals. Several individuals have expressed general agreement with the purpose and need for the Proposed Action but suggest that more traditional treatment intervals, fewer acres treated per entry and smaller treatment areas might be equally effective and less impactive than the Proposed Action.

Issue 7: The Effects of Using Burning Practices as the Only Vegetative Treatment Within the Implementation Area.

This issue developed from an individual concern of conducting timber harvest and associated road construction within the inventoried roadless areas. It was suggested to use burning as the only vegetative treatment within the inventoried roadless areas. This suggestion was expanded to focus on the effects that utilizing prescribed fire has on attaining the desired future condition of the entire Implementation Area. The use of prescribed fire presumes that burning would more closely approximate natural processes than would timber removal.

OTHER ISSUES

During the scoping process, comments were received and concerns expressed that identified other issues related to how the proposed treatments met the Forest Plan Objectives and Standards. However, the relative difference between the anticipated effects regarding these issues was not enough to provide a clear basis for choice among alternatives. Consequently, specific alternatives were not developed to respond to these issues. Chapter IV of the DEIS discloses the environmental effects of all of those components of the environment that are likely to be affected by project implementation.

ALTERNATIVES CONSIDERED IN DETAIL

The Interdisciplinary Team reviewed, analyzed, and summarized public scoping comments and used the information to identify eight action alternatives, including the Proposed Action. Five of the these alternatives (A, C, D, E and F) are addressed in detail in the environmental analysis. Alternative B is the No Action

Alternative and is also analyzed in detail. Three alternatives (G, H and I) were eliminated from detailed analysis.

ALTERNATIVE DESCRIPTIONS

Alternative A: Proposed Action

This alternative represents the Proposed Action and is the action for which public comment was sought. Treatment areas were selected to target areas that display the greatest departure from the desired vegetative conditions defined during the Big Belts Landscape Analysis. Prescriptions were designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands or reduced plant productivity and species diversity to below natural levels. Target acres were determined to achieve restoration of 50 percent of the forested warm-dry habitats and grassland habitats and 17 percent of the forested cool-moist sites.

Treatments would be designed to include a mosaic of untreated stand reserves of 20-30 percent of the area within the treatment boundaries. The stand reserves would vary in size. Stands would be regenerated by planting 106 acres and natural regeneration of 1456 acres.

Implementation would require construction of approximately 17.3 miles of temporary road and reconstruction of 9.6 miles of existing road. All new roads would be obliterated and returned to natural contour after treatments are completed. Approximately 9.5 miles of the new construction are included within the Cayuse Mountain (3.4 miles), Irish Gulch (4.2 miles) and Camas Creek (1.9 miles) Roadless Areas. Closures of existing roads are proposed on 1.2 miles in Irish Gulch and 0.64 miles in the Camas Creek Roadless Area. Several miles of existing, but administratively closed, 4X4 roads in the Camas Ridge and Atlanta Creek areas will be recontoured and revegetated.

Alternative B:

Under this alternative, none of the actions identified in the Proposed Action would occur. This alternative responds to those concerns that oppose any additional vegetative manipulation or road construction in the Implementation Area and provides a baseline to compare the amount and rate of change of each of the action alternatives.

Alternative C:

Alternative C was designed to meet the purpose and need while addressing internal and public concerns of elk vulnerability during the hunting season (Issue 1). In addition, it addresses forest health by treating more stands with heavy mortality. Treatment areas and road construction and existing road closures are located and designed to increase the level of security for the affected elk herd unit during the big game hunting season. Security areas were determined using the Hillis security area concept (Defining Elk Security: The Hillis Paradigm). Hillis defines security as areas of at least 250 acres which are 40 percent cover and more than one-half mile from an open road. This standard was used for areas south of Slough Creek except that cover is increased to 50 percent. North of Slough Creek, canopy closure will be provided where possible to improve big game security and to compensate for the more open nature of the landscape. Prescriptions would also be designed to retain 50 percent cover, where possible, and to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands.

Untreated reserve patches would be included within all prescriptions. Individual reserve trees would also be retained. Approximately 20-30 percent of the treatment areas would be retained in reserve patches. Stands would be regenerated by planting approximately 285 acres and natural regeneration of 1075 acres.

For Alternative C, approximately 9.0 miles of road construction and 7.0 miles of road reconstruction would be needed. No new roads are proposed within either the Cayuse or Irish Gulch Roadless Areas. An estimated 1.2 miles of temporarary road would be needed in the Camas Creek Roadless Area. All new roads would be closed to motorized use after project implementation is completed. About 32 miles of existing roads will be closed. Closures of existing roads in the Roadless Areas are proposed in Cayuse (0.4 miles), Irish Gulch (4.3 miles) and Camas Creek (5.9 miles).

Alternative D:

Alternative D was developed to respond to concerns expressed for maximizing monetary returns of project implementation (Issue 2). The alternative was developed to treat total acres comparable to the acres contained in the Proposed Action. To maximize monetary returns the alternative treats those forested stands that provide the greatest monetary returns at the least cost for implementing. Stands proposed for harvest generally are capable of regeneration by natural means, tractor yarding and dozer slash treatment and site preparation. Stands requiring hand planting, broadcast burning, cable yarding and other high cost elements are not favored in this alternative.

Nonforested acres selected for burning treatment were identified as areas most in need of treatment to increase production and vigor and are reasonably accessible for treatment.

Treatment areas would contain untreated stand reserves that occupy 20-30 percent of the unit. The size of the reserve patches would generally increase as the unit size increases.

Stands would be regenerated by planting approximately 233 acres and natural regeneration of approximately 1954 acres.

Implementation of Alternative D would require construction of 25.6 miles of road and reconstruction of 15.0 miles of existing road. Construction of 17.9 miles of temporary roads would be required in the Cayuse (4.8 miles), Irish Gulch (7.9 miles), and Camas Creek (5.2 miles) Roadless Areas. About 1.1 miles of existing road in the Cayuse Roadless Area would be permanently closed.

Alternative E:

Alternative E responds to those concerns for avoiding impacts to inventoried roadless areas (Issue 3). No roading or vegetative treatments are proposed within the Roadless Areas. Treatments were selected outside of the roadless areas with an attempt to still achieve the target acres determined for the Implementation Area and designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands.

Areas treated by silvicultural prescription would leave 20-30 percent of the total treatment area in stand reserves. Stands would be regenerated by approximately 138 acres of planting and 1861 acreas of natural regeneration. Areas to be treated are more concentrated and there is a reduction of the number of acres to be treated.

Approximately 14.8 miles of road construction and 14.5 miles of reconstruction would be needed to implement this alternative. An estimated 21.5 miles of existing roads would be closed in the Wagner Gulch, Long Gulch, Ohio Gulch, and Atlanta Creek areas.

Alternative F:

This alternative treats only those areas that do not require new road construction. It responds to those concerns expressing opposition to any new road construction (Issue 4). Helicopter yarding is proposed for stands needing treatment that are within 7000 feet of existing roads and not accessible by conventional

wheel, track, or cable harvest systems. Stands not accessible from existing roads or helicopter yarding are not considered available for treatment with this alternative.

Prescriptions were designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands. Untreated reserve patches would represent 20-30 percent of treatment areas. Stands would be regenerated by natural regeneration of approximately 2717 acres.

No road construction is planned. Reconstruction of about 8.6 miles of existing road would be needed. About 21 miles of existing roads would be closed in the Wagner Gulch, Ohio Gulch and Atlanta Creek areas.

ALTERNATIVES IDENTIFIED BUT ELIMINATED FROM DETAILED STUDY

Three other alternatives were developed but were eliminated from detailed analysis. During the preliminary analysis of these alternatives, the Interdisciplinary Team concluded that none warranted detailed analysis.

COMPARISON OF ALTERNATIVES

This section presents a comparison of alternatives by issue. It provides a comparative summary of how the alternatives respond to the purpose and need for action, response to the significant issues, the projected outputs and other environmental effects that may influence alternative selection. Based on this discussion the deciding officer and the public should be able to see why some alternatives affect resources/issues differently than others, and what the trade-offs are between alternatives; that is, provide "a clear basis for choice among options by the decision maker and the public".

ISSUE 1: The Effects of Vegetative Treatments and Road Construction on Elk Vulnerability During Hunting Season.

The amount and distribution of secure habitat during the hunting season is the best known measure of elk vulnerability. The alternatives provide different levels of security due to the variations in amount, method, and location of vegetative treatments and the number, distribution, and effectiveness of motorized vehicle closures.

Alternative D is estimated to provide security over 27 percent of the elk herd unit. This is below the recommended minimum of 30 percent. A high rate of displacement of elk from public to private lands would probably occur under these conditions. Early season harvest of bull elk should be relatively high. Harvest success would obviously drop later as the animals move to more secure private lands.

The other alternatives provide between 31 and 36 percent security. At any of these levels, security on National Forest lands is considered sufficient to hold elk throughout the season and provide for sustainable harvest throughout the hunting season. A relatively high migration of elk to private lands will still be expected because of the high levels of security related to the very limited hunting and lack of public access on the adjacent private lands. Alternative C would provide the greatest amount of secure area and should, therefore, provide the greatest opportunity to retain elk on public lands during hunting season.

ISSUE 2: The Effectiveness In Providing Maximum Economic Benefits.

Alternative D is expected to yield the greatest volume of commercial wood fiber (12 MMBF) and return the greatest revenue ($915,000) to the Counties. The alternative also provides the most favorable cost:benefit ratio (1.30).

Alternative E will provide about 10 MMBF of wood products, return $757,500 to the counties and have a cost:benefit ratio of 1.25.

Alternative F has an unfavorable cost:benefit ratio of 0.72. However, it represents the second largest estimated volume (11 MMBF). The payments to Counties estimated from implementation is $840.000.

The costs of implementing Alternative C results in the lowest cost:benefit ratio of 0.66. The expected revenues to Counties from the 6 MMBF of commercial timber is $472,500.

Alternative A is estimated to provide 9 MMBF of timber and return $675,000 to the Counties. The benefit:cost ratio is calculated at 1.07.

Alternative B, since it provides no outputs, would provide no revenues from the sale of commercial products.

ISSUE 3: The Effects of Activity on the Roadless and Wilderness Characteristics of the Cayuse, Camas, and Irish Gulch Roadless Areas.

Neither Alternatives B or E propose any vegetative treatments in the inventoried roadless areas. Alternative E proposes closure of about 3.5 miles of existing roads in the Camas Creek Roadless Area. Existing roadless attributes and eligibility for Wilderness designation would be retained with either alternative.

Alternative C proposes commercial timber harvest and prescribed burning in each of the roadless areas. Alternative D also proposes harvest in each of the areas but prescribed burning is limited to the Cayuse Gulch Roadless Area. Neither alternative, if implemented, would forego the consideration of any of the areas for Wilderness designation.

Alternatives A and F include timber harvest and prescribed burning in each roadless area. Each alternative would retain the wilderness eligibility for the Cayuse and Camas Roadless Areas. Neither alternative would retain contiguous blocks of 5,000 acres needed to retain Wilderness eligibility for the Irish Gulch area.

Table II-6 displays more detailed information of the proposed activities and acres affected within the three roadless areas.

ISSUE 4: The Effects of Building New Roads Within the Implementation Area.

All action alternatives except Alternative F propose construction of temporary roads and all propose some reconstruction of existing roads. The closure of all new roads to motorized use is common to all of the alternatives. Obliteration of the road prism and restoring the disturbed area to original contour is the predominate method of closure.

Each of the action alternatives also propose some closures of existing roads.

Table II-6 displays a tabular summary of the estimated miles of roads constructed, reconstructed, and closed.

ISSUE 5: The Effectiveness of the Proposed Vegetative Treatments in Responding to Forest Health Problems and sustainability of Ecosystems.

Although the alternatives differ substantially in the methods and distribution of treatments, all treatments will improve the overall health and sustainability of the treated areas. Generally, it is assumed that the more area that is treated, the greater the movement towards desired vegetative conditions.

Alternatives A, E and F treat approximately the same number of forested acres; 3,386, 3,324 and 3,492, respectively. However, they differ substantially in the number of grassland acres treated. Alternative A burns 2,913 acres of grasslands. Alternative F burns 2,464 acres and E burns 815 acres, the lowest of any action alternative.

Alternative D treats 3,004 acres of forested vegetation and 1,402 acres of grasslands.

Alternative C proposes treatment of the fewest forested acres, 2,849, but treats 2,507 acres of grasslands.

All action alternatives propose some treatments in old growth stands. Treatments on the warm/dry sites in ELU 4 will not decrease the effectiveness of the old growth but will enhance the sustainability of the stands. The amount of old growth enhanced varies from 40+ acres in Alternatives C and D to 108 acres in Alternative F.

Alternatives A, D, E and F also harvest existing old growth on the cool/moist habitats of ELU 4. Old growth characteristics will be immediately lost on these acres. The amount of treatment varies from 70 acres in Alternative D to 106 acres in Alternative E.

Alternative B, of course, does not involve any treatments.

ISSUE 6: The Effects of Applying Ecosystem Management Principles Versus Traditional Forest Service Management Principles to the Implementation Area.

An alternative designed to treat vegetation with traditional features such as 10 year treatment intervals, concentrated treatment areas and smaller treatment units was not developed.

The IDT recognized that such an alternative had some benefit in comparing the effects of such an alternative against the nontraditional approaches featuring ecosystem management principles. However, the team concluded that an alternative of this nature was inconsistent with the National emphasis and direction for ecosystem management and also inconsistent with the findings from the Big Belt Landscape Analysis. Consequently, the benefits of developing the alternative just for comparative purposes did not seem to offset the costs of developing an alternative that would be inconsistent with current Agency direction.

ISSUE 7: The Effects of Using Burning Practices as the Only Vegetative Treatment Within the Implementation Area.

An alternative was not developed that limited vegetative treatments to burning. While natural or prescribed fire might provide movement towards the desired vegetative conditions for most of the forested areas needing treatment, the costs of treating stands that can be economically harvested and provide usable forest product was not considered prudent. Deferring treatments of those stands and limiting treatment to the forested and grassland sites where burning seemed appropriate would not contribute to enhancement of vegetative health and ecosystem sustainability of the forested stands needing silvicultural treatments.

THE ENVIRONMENTALLY PREFERRED ALTERNATIVE

Alternative E is the environmentally preferred alternative.

TABLE S-1 COMPARISON OF ISSUES BY ALTERNATIVE

	ALTERNATIVES					
COMPARISON ELEMENT	A	B	C	D	E	F
ISSUE I - Elk Vulnerability						
Miles open road	79	81	49	69	60	60
ORD (Mi/Mi^2)	.96	.98	.59	.83	.72	.72
HC maintained (%)	34	36	35	34	34	35
Security Area (%)	31	31	36	27	33	31
ISSUE II - Economics						
Acres harvested	2619	0	1911	3004	2807	3208
Volume (MMBF)	9.0	0	6.3	12.2	10.1	11.2
Gross receipts ($M)	2,700	0	1,890	3,660	3,030	3,360
B/C ratio	1.07	NA	0.66	1.30	1.25	0.72
PNV (M$)	8.5	NA	-1,068.0	696.9	427.7	-1,321.5
ISSUE III - Roadless						
Cayuse Gulch 19353						
Acres harvested	222	0	473	147	0	158
Acres burned	891	0	1055	141	0	846
Acres affected	1191	520	2273	917	520	646
Acres unaffected	18162	18833	17080	18436	18833	18707
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	13.6	13.6	13.6	13.6	13.6	13.6
New roads	3.4	0	0	4.8	0	0
Existing rds. closed	0	0	.4	1.1	0	0
Irish Gulch 7,787						
Acres harvested	208	0	74	238	0	736
Acres burned	1232	0	938	590	0	664
Acres affected	2768	320	394	1258	320	7787
Acres unaffected	5019	7467	7393	6529	7467	0
Wilderness eligibility	NO	YES	YES	YES	YES	NO
Existing roads	6.2	6.2	6.2	6.2	6.2	6.2
New roads	4.2	0	0	7.9	0	0
Existing rds. closed	1.2	0	4.3	0	0	0
Camas Cr. 28,832						
Acres harvested	304	0	194	529	0	159
Acres burned	569	0	474	590	0	402
Acres affected	2639	2335	1609	3759	915	2399
Acres unaffected	26193	26497	27223	25073	27917	26433
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	16	16	16	16	16	16
New roads	1.9	0	1.2	6.7	0	0
Existing rds. closed	.64	0	5.9	0	0	0
ISSUE IV - Roads						
Miles new construction	17.3	0	9.0	25.6	14.8	0
Miles reconstruction	9.6	0	7.0	15.0	14.5	8.6
Miles new roads closed	17.3	0	9.0	25.6	14.8	0
Miles existing roads closed						
Yearlong	1.8	0	21.0	5.5	14.5	14.0
Seasonal	0	0	11.0	7.0	7.0	7.0

COMPARISON ELEMENT	A	B	C	D	E	F
ISSUE V - Forest Health						
Acres treated Total	6299	0	5376	4406	4139	5956
Clearcut	423	0	150	457	52	209
Seed tree	102	0	198	1097	686	1208
Shelterwood	821	0	1027	407	746	371
Commercial thin	0	0	177	252	385	0
Selection	899	0	359	711	998	1438
Forested burn	1141	0	958	80	457	266
Grasslands burned	2913	0	2507	1402	815	2464
Acres dead forests regenerated	0		566	272	329	181
Acres insect and diseased forest treated	1970	0	1192	1752	1767	2093
Acres Old Growth removed						
Existing	96	0	0	70	106	118
Potential	0	0	0	0	0	0
Acres Old Growth remaining						
Existing	1364	1460	1460	1390	1354	1342
Potential	794	794	794	794	794	794

CHAPTER I - PURPOSE & NEED

CHAPTER I - PURPOSE AND NEED

CHANGES BETWEEN THE DRAFT AND FINAL

Miles of new road construction and reconstruction have been changed slightly to reflect the most current estimates. No other substantive changes were made.

INTRODUCTION

The Wagner/Atlanta Vegetation Treatment Final Environmental Impact Statement (FEIS) is tiered to the 1986 Helena National Forest Land and Resource Management Plan (Forest Plan) Final Environmental Impact Statement (FEIS) and relies on the direction provided by the Forest Plan. The Big Belts Landscape Analysis further refined Forest Plan direction and identified possible management opportunities for achieving an integrated desired condition needed to implement the Management Area goals contained in the Forest Plan. The Landscape Analysis provided the supporting rationale for developing the purpose and need and design of the Proposed Action.

This chapter identifies the Proposed Action, the Implementation Area, the purpose and need for the Proposed Action, the scope of the analysis, the decision needed, and the organization of chapters and subject matter presented in this document.

I. PROPOSED ACTION

The Helena National Forest proposes to move towards a desired landscape resource condition. The Proposed Action includes a combination of vegetation treatment activities for achieving the "desired conditions" consistent with the Forest Plan and further defined in the Big Belts Landscape document.

The Proposed Action includes implementing vegetation restoration practices on nearly 6,300 acres of grassland and forested vegetation on the east side of the Big Belt Mountains on the Townsend Ranger District, Helena National Forest. The proposal also includes combinations of prescribed fire and silvicultural treatments in five watershed complexes within the 36,660 acre Implementation Area. The Implementation Area includes about 10,600 acres of private land and generally extends from the Rubison Creek drainage to the Atlanta Creek drainage. Map I-1, Vicinity Map, displays the general location of the Implementation Area.

Alternative Map A shows the location of specific treatments proposed. Specific activities include the following:

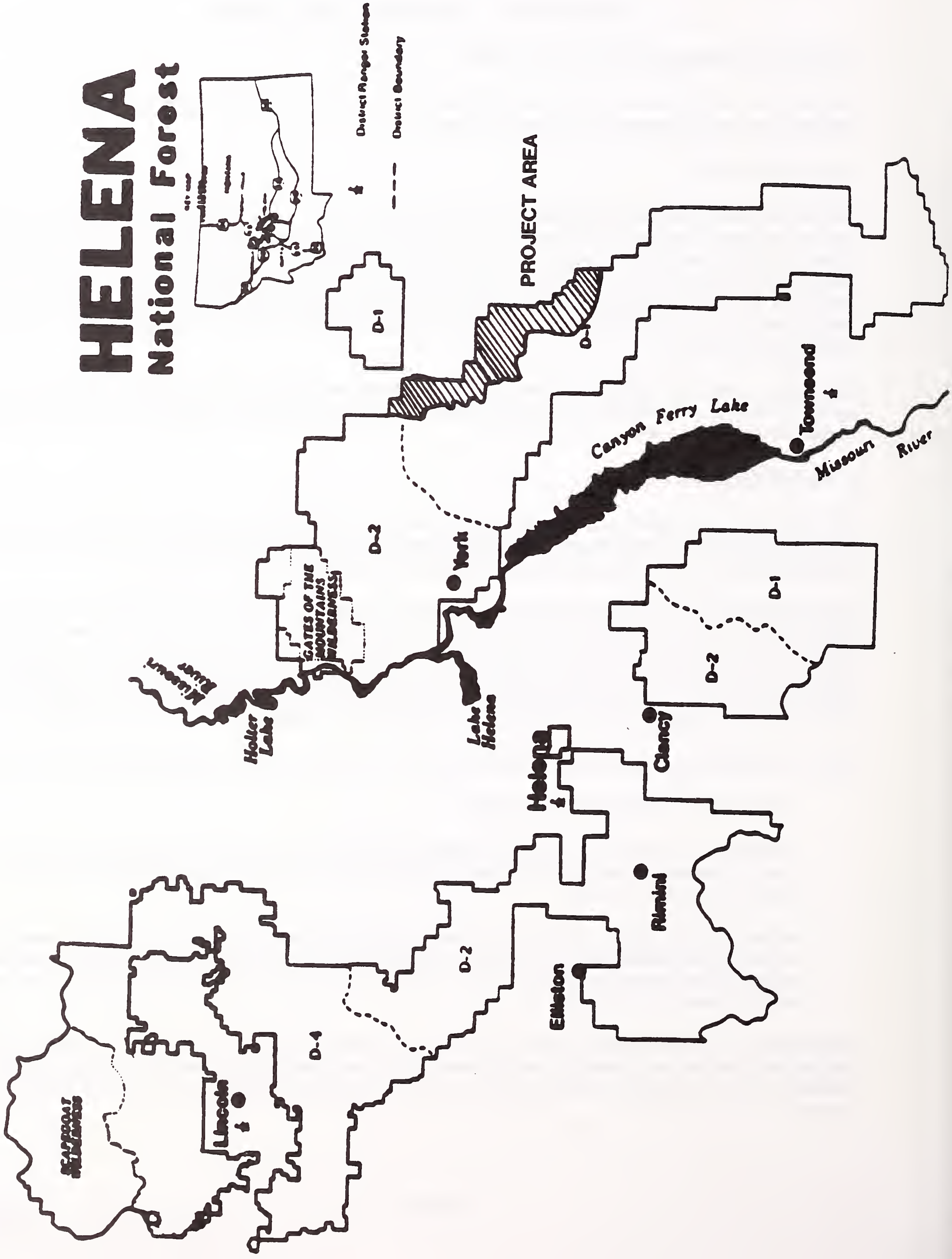
- Prescribe burn 2913 acres of grassland.

- Treat forested vegetation using the following methods: 423 acres of clearcutting with reserves, 821 acres of shelterwood harvest, 899 acres of select harvest, 102 acres of seed tree harvest, and 1141 acres of prescribed burning.

- Construct 17.3 miles of temporary road and reconstruct 9.6 miles of existing road. These roads will be permanently closed to use by recontouring and revegetating the disturbed areas after vegetative treatments are completed. An additional 1.8 miles of existing roads within the Implementation Area will also be closed.

Treatments are expected to begin in 1995. The duration of treatments is expected to be five to eight years. No additional entries are planned in the Implementation Area until approximately 2020. Restoration and recovery of sites damaged by fire, insects and/or other unplanned disturbances may be proposed, as needed.

MAP 1-1 WAGNER ATLANTA PROJECT AREA VICINITY MAP



II. PURPOSE AND NEED FOR ACTION

In general terms, the purpose and need for the proposed action is to move towards the desired conditions for nonforested and forested vegetation within the Wagner/Atlanta Implementation Area as identified in the Helena Forest Plan and the Big Belts Landscape Analysis. By incorporating ecosystem management principles, the purpose and need includes sustaining a combination of resources rather than emphasizing only a single resource.

A. BACKGROUND INFORMATION - ECOSYSTEM MANAGEMENT

Because Ecosystem management practices are the driving force behind the purpose and need for this action and the foundation of this document, it is important to have a clear and concise understanding of ecosystem management and how it functions.

In direction provided by a June 4, 1992 letter, the Forest Service adopted an ecological approach to land management called ecosystem management. *Ecosystem management means using an ecological approach to achieve the multiple-use management of national forests and grasslands by blending the needs of people and environmental values in such a way that National Forests and Grasslands represent diverse, healthy, productive, and sustainable ecosystems on a landscape level.*

Ecosystem management is embodied in the range of alternatives considered in Chapter II of this EIS, and in the analysis framework used to assess these alternatives.

Aims for ecosystem management include:

- Take care of the land by continuing to restore and sustain the integrity of its soils, air, waters, biological diversity, and ecological processes.

- Within the sustainable capacity of the land, meet the needs of people who depend on natural resources for food, fuel, shelter, livelihood, and inspirational experiences.

- Within the sustainable capacity of the land, improve the well-being of communities, regions, and the nation through diverse, cost-effective, and environmentally sensitive production, use, and conservation of natural resources.

- Seek balance and harmony between people and the land with equity between interests, across regions, and through generations, meeting this generation's resource needs while maintaining options for future generations to also meet their needs.

- Improve the effectiveness of public participation in land and resource decision-making.

- Expand conservation partnerships between Forest Service managers, other agencies, and the publics they serve in carrying out ecosystem management.

- Strengthen teamwork between managers and scientists, including the integration of social, biological, and physical science disciplines.

Two fundamental aspects must be balanced when applying ecosystem management principles: ***needs of the people*** and ***environmental values***. The range of alternatives considered in this EIS provide choices for achieving that balance. Environmental values are analyzed with an ecosystem management perspective focusing on broad landscape scales and ecological sustainability.

In summary, ecosystem management is the term used to describe the change in emphasis in the management of National Forest System lands. It is the use of an ecological approach that blends social, physical, economic and biological needs and values to assure productive, healthy ecosystems. The overall goal of ecosystem management is to provide for healthy, diverse, and productive landscapes for the long-term. Resource commodities such as timber, huntable wildlife, recreation opportunities and forage for livestock are suitable outputs of that system.

B. PURPOSE AND NEED DEFINED

The Proposed Action is designed to respond to the overall guidance (goals, objectives, standards, and Management Area direction) of the Helena National Forest Land and Resource Management Plan (Forest Plan). The Forest Plan and its accompanying Environmental Impact Statement (EIS), to which this document is tiered, are on file and available for review at the Townsend Ranger District Office, the Helena National Forest Supervisor's Office, and the Forest Service Northern Regional Office.

To bridge the gap between the broad management direction given by the Forest Plan and ecosystem management principles, a landscape level analysis for the Big Belt mountains was completed in 1994. The range of physical and biological conditions that occurred prior to the settlement of Europeans in the Big Belt Mountains, called the ***historic condition***, was estimated. This historic condition is described as a spectrum of conditions possible in ecosystem composition, structure, and function, considering both temporal and spatial factors when systems are allowed to function with natural processes.

As a baseline, the natural ranges for vegetation and soils were considered the ***desired conditions.*** This assumed that if conditions on the landscape are similar to those that the native plant and animals species evolved under and adapted to, then the full complement of species adapted to this ecosystem is sustained over time (the probability of extinctions is decreased). If management is outside of that natural range, the tradeoffs can be identified and considered in decision making.

Today, vegetation communities in the Implementation Area differ from those found a few hundred years ago, structurally as well as in the acreages and patterns that various communities occupied on the landscape. The absence of any disturbance, either management induced or a natural event, will magnify these differences. One structural difference, higher quantities of "fuel" and its arrangement, has altered the burning characteristics of some of these communities. Vegetation that would have historically supported only a low intensity fire currently would be expected to burn at high intensities. In turn, uncontrolled high intensity wildfires are expected to produce undesirable results such as soil damage, increased soil movement, and the loss of old growth trees. The proposed action is intended to shift the trend back towards the desired condition and to reduce the risk of adverse effects from catastrophic wildfire.

The desired conditions, as stated in the Big Belts Landscape Analysis, reflect compromises between social and economic "desires" and the natural ranges. Implementation of projects to reach the desired conditions is scheduled on a watershed basis. The area under consideration at this time is the Wagner/Atlanta Implementation Area, as described in the Big Belts Landscape Analysis document. This particular area was selected for treatment because the vegetative conditions within the area display the greatest departure from desired conditions than any other portion of the Big Belts Analysis Area.

More specifically, the proposed action has the following purposes:

- To restore and maintain healthy and sustainable grassland ecosystems.

This will be accomplished by restoring site productivity, species composition and diversity, and natural function on approximately 2,900 acres of naturally occurring grasslands through the use of prescribed burning.

Grassland sites historically occupied 30-40 percent of the south and west slopes in the Implementation Area. Under natural conditions, the grasslands were maintained by frequent, low intensity wildfires. Due to the influence of fire suppression activities over most of this century, the natural role of fire has been excluded from most of these sites. Consequently, grasslands have become less productive. Species diversity and palatability and plant vigor have been reduced. Some colonization by Douglas-fir has occurred, thereby reducing grassland areas. Futhermore, savannah grassland habitat types now have a more closed canopy. Grasslands currently occur on only 20-25 percent of the area. The sites proposed for treatment represent those grasslands where stagnation and conifer colonization exhibits the greatest deviation from historical conditions.

- To restore and maintain healthy and sustainable forested ecosystems.

Due to several decades of suppressing natural wildfires, most of the forested stands in the Implementation Area have developed into much denser vegetation than occurred under natural conditions. Eliminating historical, low intensity wildfires (with its associated effects of thinning) has resulted in more densly stocked stands. The excess growth is causing stress to individual plants as they are competing for space, moisture and nutrients. Individual trees and forested stands are more vulnerable to insects and disease once stressed from overcrowding. Ladder fuels buildup has resulted in the potential change of burn intensity from low intensity underburning to high intensity stand-replacing burns.

In forests which functioned with lethal (stand replacing) fire the biological rotation of the forest was approximately 150 years. That is, forests on the average burned at an intensity which would kill most of the trees at that frequency. These forest types are adapted to this cycle and naturally regenerate following such a process. Such forests are generally upper elevation and occur in cool/moist habitats.

Forests which functioned with non-lethal fire processes were exposed to frequent low intensity fires. These forests underburned every 10 to 30 years, with mature trees adapted to survive these low intensity fires. Eventually, individual trees within these forests die and are replaced by a successor. Mature forests are constant on the landscape and function with individual tree replacement. These forests are generally low elevation and occur in warm/dry habitats.

This project is designed to reenter the implementation area every 25 years for vegetative manipulation. Therefore, forests which functioned with lethal (stand replacement) disturbance processes have 1/6 (25 year entry with 150 year biological rotation) of their acreage proposed for treatment.

Natural processes within forests which were historically subject to frequent non-lethal disturbance processes have been disrupted by many decades of fire control activities and are in greater need of restoration. One half of the acreage of this forest type is proposed for treatment in this analysis.

The overall age structure of forested stands also deviates from the age class distribution representative of natural conditions. The majority (76%) of the stands are in the 100 and 125 year age classes. Age distribution is evenly distributed within the other age classes. The abundance of forest vegetation in the 100 and 125 age classes, combined with the unnaturally thick vegetative growth, increases the risk of large catastrophic events (wildfire, insects, disease). Vegetative treatments are needed to create a more natural distribution of age classes and reduce the risk of future catastrophic stand replacing events.

III. SCOPE OF THE ANALYSIS

To determine the scope of the action, the alternatives, and the impacts to consider in this Draft Environmental Impact Statement, the interdisciplinary team (IDT) applied the principles of the regulations implementing the National Environmental Policy Act (NEPA), 40 CFR 1508.25.

A. GEOGRAPHIC SCOPE

The Townsend Ranger District, Helena National Forest has prepared this Environmental Impact Statement to document the analysis and disclose the environmental impacts of alternative management actions in the greater Wagner/Atlanta Creek watersheds of the Big Belt Mountains. The Big Belt Mountains are located east of Helena, Montana. Wagner and Atlanta Creeks fringe the east flank of the Big Belt Mountains approximately 20 air miles northeast of Townsend, Montana.

B. TEMPORAL SCOPE

The selected alternative will be implemented as early as 1995 and may take as many as five to eight years to implement. Vegetation restoration practices are based on a 25 year entry schedule.

Using a 25 year entry schedule, all of the warm/dry aspects would be treated in two entries (50 years) and the cool/moist aspects would need to be treated in 6 entries (150 years) to achieve the integrated desired condition of balanced age classes of forested vegetation with an average maximum age of 150 years. ***This proposal addresses the first entry only.***

C. ADMINISTRATIVE SCOPE

This EIS is not a decision document. It is a document disclosing the environmental consequences of implementing the different alternatives being considered, including the No Action Alternative. Based on the findings in this EIS, the Deciding Official will make a decision and document that decision in a Record of Decision.

D. SCOPE OF THE DECISION NEEDED

The Deciding Officer is the Forest Supervisor. The decision needed is to determine what actions, if any, are to be implemented to respond to the purpose and need for the Proposed Action and the identified issues.

E. FEIS ORGANIZATION

The FEIS includes five chapters, including this one.

Chapter II describes alternative ways (including no action) of addressing or resolving environmental issues related to the implementation of this proposal. The alternatives to the Proposed Action were developed in response to issues identified during the scoping process. All action alternatives fulfill the purpose and need for the proposal to some degree. The alternatives are displayed so that a comparison can be made of the environmental effects of each. Each of the action alternatives includes treatment areas which vary in size, location, and treatment methods, and require varying amounts of new road construction.

Chapter III summarizes Forest Plan direction for the lands within the Implementation Area and describes the existing condition of physical, biological, social, and economic components of the environment that may be affected by implementation of any of the alternatives. The discussion focuses on the resources related to the significant issues.

Chapter IV describes the environmental consequences associated with implementation of the alternatives, using the descriptions in Chapter III as the baseline for measurement. Direct, indirect, and cumulative effects are discussed, and the effectiveness of mitigation measures is assessed.

Chapter V describes the public involvement that occurred during this project. Included in the chapter is a list of those agencies, organizations and individuals who commented on the DEIS. A summary of the substantive comments received on the DEIS and responses to those comments is also included.

The List of Preparers and Agencies Consulted contains a listing of the individuals who prepared this DEIS, including their names, educational qualifications, area of expertise, and years of experience relating to natural resource management. Agencies consulted during preparation of the EIS are also listed.

The Glossary defines terms used in the text that may be unfamiliar or specialized. Acronyms are defined after their first usage in the text and also in the Glossary.

The Appendices contain analytical reports and additional information in support of the discussions in Chapters II-IV.

CHAPTER II– ALTERNATIVES

CHAPTER II - ALTERNATIVES

CHANGES BETWEEN DRAFT AND FINAL

Several changes have been made in this chapter since publishing the DEIS. These changes were made in response to comments received on the DEIS or to reflect more current information. The following is a summary of those changes.

-The Alternative Development Section was expanded to acknowledge the response to comments on the DEIS.

-The monitoring section has been expanded to display monitoring activities specific to this proposal.

-Maps of individual alternatives have been reduced in size and included in this chapter. The DEIS provided larger maps in a separate map package.

-Tables II-1 through II-5 have been modified to identify the Management Areas encompassing individual treatment units.

-Table II-6 reflects more refined information for Economics, Roads, and Forest Health issues.

INTRODUCTION

This chapter features the alternative development process, issues, alternatives, and a summary of effects by alternative. Five action alternatives and a no-action alternative are considered in detail. Each action alternative represents a different combination of restoration practices. Three alternatives were developed but subsequently eliminated from detailed study.

The alternatives were developed to display and analyze various ways to achieve the goals and objectives of the Forest Plan and the purpose and needs of this project. Each alternative responds to one or more of the significant issues identified from internal or public scoping. These alternatives provide the Deciding Officer with a range of alternatives from which to choose.

I. ALTERNATIVE DEVELOPMENT PROCESS

This section of the chapter outlines the process used to formulate the alternatives.

A. PUBLIC INVOLVEMENT

Formal scoping for the EIS began with the publication of the Notice of Intent to Prepare an Environmental Impact Statement (NOI) in the Federal Register on July 20, 1993. The NOI presented a summary of the Proposed Action, the purpose and need for the action, tentative environmental issues and other supplementary information. It also expressed the importance of public participation and input, particularly during the initial scoping period and, later, during the period provided for comment on the DEIS.

News releases were printed in three local newspapers during the month of July. They included the Independent Record (July 17, 1993), the Townsend Star (July 15, 1993) and the Meagher County News (July 15, 1993).

Public input was also solicited at three Open Houses. Four people attended the July 20, 1993 meeting at Townsend, five people attended the July 21, 1993 meeting at the Kings Hill Ranger District in White Sulphur Springs, and six people attended the July 22, 1993 meeting at the Forest Supervisor's Office in Helena,

Montana. Those attending represented a wide range of interests. Oral and written comments were received both during and after the Open Houses. These comments are available for review in the project file.

All comments received prior to September 9, 1993, were used to identify issues for the DEIS.

Invitations were sent to more than 50 individuals and groups to participate in field trips to the Implementation Area. News releases were also published in the Helena, Townsend, and White Sulphur Springs newspapers to invite interested parties. Public field trips were held on October 5 and November 2, 1994. A total of 16 individuals, representing the following organizations and agencies participated;

Last Chance Audubon Society	MT. Environmental Protection Agency
Public Forestry Foundation	Native Ecosystem Council
Sierra Club	Patagonia Environmental Program
Ecology Center	Alliance for the Wild Rockies
Meagher County Weed Board	American Wildlands
Townsend area tree farmer	White Sulphur Springs area ranchers

In addition to acquainting participants with the current status of the project, the Forest Service wanted to hear public comments to validate that issues had been adequately identified and the range of alternatives were responsive to the issues. Meeting notes of these field trips are contained in the Project File.

Comments were received from 42 individuals, organizations, and agencies in response to the DEIS. The comments received were analyzed and categorized for response. A summary of the comments and responses to them is contained in Chapter IV of this document. Copies of all comments are available for review in the project file.

B. SIGNIFICANT ISSUES

Section 102(2)(e) of the National Environmental Policy Act (NEPA) states that all Federal agencies shall "study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources". These unresolved conflicts, identified by the Forest Service and the public, are the environmental issues related to the Proposed Action.

In addition to responding to unresolved conflicts, an EIS must rigorously explore and objectively evaluate all reasonable alternatives (40 CFR 1502.14[a]). Case law has established that this requirement does not mean that every conceivable alternative must be considered, but that selection and discussion of alternatives must permit a reasoned choice and foster informed decisionmaking and informed public participation.

Public comments were formally analyzed by the Public Information Officer on the Helena National Forest. Issues were added to the preliminary list and a final description of issues was formalized. The documentation for issue identification and summarization is located in the project file.

No additional issues were identified from responses received on the DEIS.

A summary of the issues follow:

Issue 1: The Effects of Vegetative Treatments and Road Construction on Elk Vulnerability During Hunting Season.

The Montana Department of Fish, Wildlife and Parks and numerous organizations and individuals are concerned with losses of secure habitat for elk populations during the big game hunting season. Loss of hiding cover and ease of access for hunters are the primary components affecting the ability of public lands

to hold elk during the hunting period and provide for huntable populations of bull elk throughout the entire hunting season. While providing for secure habitats is the focus of this issue, respondents also expressed concerns for hiding and thermal cover, riparian habitat, travel corridors, avoidance of habitat fragmentation and the construction of new roads.

The indicators used to evaluate this issue are:

- **Miles Open Road:** This indicator displays the miles of road that are open during the hunting season.

- **Open Road Density:** This indicator displays the average miles of open road/square mile within the elk herd unit (EHU) during the general hunting season. Permitted open road density varies with the amount of hiding cover available.

- **Percent of Hiding Cover Maintained:** This indicator applies to big game summer range. The Forest Plan Standard is a minimum of 35 percent hiding cover.

- **Percent of Area Providing Security:** Security areas are identified as areas at least one-half mile from open roads that possess the habitat characteristics to maintain elk during the hunting season. Security is considered adequate when 30 percent of an EHU provides security.

Issue 2: The Effectiveness of the Proposed Action in Providing Maximum Economic Benefits.

Many individuals are concerned with the economic and social benefits derived from obtaining a continuous supply of timber to support local mills and provide jobs for those employed in the wood products industry. Many of them also recognize and support the financial benefits derived from the revenue that counties receive from timber sale receipts. These people generally favor the maximum sustainable volumes of timber that can be offered. They are also concerned that sale design provides for the most efficient and economical transportation system and harvest methods. Where feasible, they favor sale designs and layout that utilize conventional harvest systems and equipment.

The indicators used to evaluate this issue are:

- **Acres Harvested:** This indicates the magnitude of the project in terms of acres of timber stands converted to a managed condition.

- **Volume Harvested (MMBF):** This measure indicates the amount of timber offered in million board feet.

- **Gross Receipts:** An indicator of monetary benefits to counties. Distribution of receipts is 75 percent to U.S. Treasury and 25 percent to counties.

- **Benefit/Cost Ratio:** This indicator is used as a measure of the economic efficiency of individual alternatives.

- **Present Net Value:** This indicator displays the current value when all marketable benefits and implementation costs are discounted to the present time.

Issue 3: The Effect of Activity on the Roadless and Wilderness Characteristics of the Cayuse, Camas, and Irish Gulch Roadless Areas.

During the scoping process, general statements were expressed opposing any additional road construction, timber harvest, burning or other development activities for the entire Implementation Area, to specific comments relative to avoidance of activities within the Cayuse, Camas and Irish Gulch Roadless Areas.

Specific concerns related to inventoried roadless areas are that timber harvest and road construction would alter the character of these areas to the extent that they would not be favorably considered for future wilderness designation. Many people perceive the areas as remote and void of visual impacts of development and prefer that they remain unchanged. Others are concerned that the security provided for game and nongame wildlife species would be diminished by proposed activities.

The indicators used to evaluate this issue are:

- **Roadless Acres Treated:** Actual acres treated.

- **Roadless Acres Affected:** Acres are affected if the wilderness attributes are altered to such a degree that future consideration for wilderness is foregone.

- **Roadless Acres Unaffected:** Acres are unaffected if the wilderness attributes are not diminished.

- **Existing Roads Within the Roadless Area:** Measured in miles of existing open and closed roads.

- **Number of New Roads Built Within the Roadless Area**: Measured in number of miles of new road built within the inventoried roadless area.

- **Eligibility for Wilderness Retained:** Eligibility is retained if the inventoried roadless area contains at least 5,000 continuous acres of unaffected lands. Wilderness attributes such as natural integrity, apparent naturalness, remoteness, solitude, primitive recreation opportunities, manageability and boundaries were considered.

Issue 4: The Effect of Building New Roads Within the Implementation Area.

Concerns expressed by many individuals have ranged from generalized statements opposing any additional road construction to statements concluding that the existing number of roads within the Implementation Area are sufficient. These concerns also include the premise that new roads create visual scars upon the landscape.

The indicators used to evaluate this issue are:

- **New Roads Built**: Measured in number of miles of new road built.

- **New Roads Closed:** Measured in number of miles of new road closed.

- **Existing Roads Closed**: Measured in number of miles of road closed.

Issue 5: The Effectiveness of the Proposed Vegetative Treatments in Responding to Forest Health Problems and Sustainability of Ecosystems.

Overall forest health and maintenance of healthy ecosystems is a strong concern of many individuals. Several Forest Service resource specialists identified some different areas that would focus on the recovery and rehabilitation of forested stands exhibiting high levels of recently dead, dying, or insect and disease damaged commercial timber or stands that are approaching the limits of their biological age. Additional expressed concerns included maintenance or reestablishment of specialized habitats such as old growth, unique plant communities, linkages and snags.

For the deciduous forest type, grasslands, shrubs, and riparian zones, concerns are based on how to maintain the health and vigor of these communities. Many of these community types are in decline due to seral stage and grazing.

The indicators used to evaluate this issue are:

- **Number of Acres Treated:** Total forested and grassland habitat acres treated by method of treatment (clearcut, seed tree, burn, etc.)

- **Number of Acres of Dead Forested Stands Regenerated:** Stands containing a significant component of which is dead or dying are considered dead stands.

- **Number of Acres of Forest Affected With Insects or Disease Treated:** Stands selected for treatment because of current insect and disease activity or high susceptibility to attack are considered affected acres.

- **Number of Acres of Old Growth Removed:** Both existing and potential old growth are included.

- **Number of Acres of Old Growth Remaining:** Both existing and potential old growth are included.

Issue 6: The Effects of Applying Ecosystem Management Principles Versus Traditional Forest Service Management Principles to the Implementation Area.

Historically, Forest Service timber harvest practices have included openings limited to 40 acres or less with reserve strips interspersed between the harvest areas. Entries within an area were generally in the range of ten year intervals. Several individuals have expressed general agreement with the purpose and need for the Proposed Action but suggest that more traditional treatment intervals, fewer acres treated per entry and smaller treatment areas might be equally effective and less impactive than the Proposed Action.

No specific indicators were identified for this issue.

Issue 7: The Effects of Using Burning Practices as the Only Vegetative Treatment Within the Implementation Area.

This issue developed from an individual concern of conducting timber harvest and associated road construction within the inventoried roadless area. It was suggested to use burning as the only vegetative treatment within the inventoried roadless areas. This suggestion was expanded to focus on the effects that utilizing prescribed fire has on attaining the desired future condition of the entire Implementation Area. The use of prescribed fire presumes that burning would more closely approximate natural processes than would timber removal.

No specific indicators were identified for this issue.

C. OTHER ISSUES

During the scoping process, comments were received and concerns expressed that identified other issues related to how the proposed treatments met the Forest Plan Objectives and Standards. However, the relative difference between the anticipated effects regarding these issues was not enough to provide a clear basis for choice among alternatives. Consequently, specific alternatives were not developed to respond to these issues. Chapter IV of the DEIS discloses the environmental effects of all of those components of the environment that are likely to be affected by project implementation.

II. ALTERNATIVES CONSIDERED IN DETAIL

The Interdisciplinary Team reviewed, analyzed, and summarized public scoping comments and used the information to identify eight action alternatives, including the Proposed Action. Five of the these alternatives

(A, C, D, E and F) are addressed in detail in the environmental analysis. Alternative B is the No Action Alternative and is also analyzed in detail. Three alternatives (G, H and I) were eliminated from detailed analysis.

A. FEATURES COMMON TO ALL ACTION ALTERNATIVES

To reduce the length of alternative descriptions, the significant features common to all action alternatives are displayed in this section. These include Regional and Forest standards, guidelines, mitigation measures, and policies. Features not common to all alternatives are included within individual alternative descriptions.

1. General

The five action alternatives would utilize both prescribed fire and timber harvest methods to modify vegetation composition, structure and function. A variety of treatment alternatives would be used depending on species present and environmental site conditions. Using the principles of ecosystem management, vegetation treatment activities would attempt to mimic natural processes and move treatment areas towards vegetative conditions which would occur under natural processes.

2. Roads and Trails

Some of the treatment areas would require new roads to be built. All of these roads would be single-lane local roads. None of the new roads would remain open for public travel, except for short-term use such as fuelwood gathering. All new roads would be designed to accommodate the planned use safely and efficiently while minimizing the effects upon the land and resources. All roads planned for public use would be designed and constructed in accordance with the Highway Safety Act of 1966 to insure adequate public safety while traveling those roads. Proper road signing, in accordance with the Manual on Uniform Traffic Control Devices, would be installed and maintained to control safe traffic flow on all roads.

Existing roads would be used to access some treatment areas. They may require maintenance or reconstruction efforts. Temporary roads would be built to a low standard and intended for short-term use. Road standards and management activities are specifically identified in Appendix A, Road Management.

Best Management Practices would be employed during all road construction and maintenance activities. When these roads are located near or cross intermittent and perennial drainages, Soil and Water Conservation Practices, as identified in FSH 2509.22, would be applied. Construction activity while crossing a perennial or intermittent stream would also require that a Stream Preservation Act Permit Application (124) be filed with the Montana Department of Fish, Wildlife, and Parks and an application for Short Term Exemption from Surface Water Quality Standards for Construction Activity (3A) be filed with the State Water Quality Bureau. Provisions of the Streamside Management Zone Act will be met.

Harvest units will be located and harvest methods adopted to avoid disturbance to Road 287 F-1 and Trails 118, 236 and 258 A-1.

3. Wildlife

All harvest units would follow Forest Plan snag guidelines. Snags would be retained both within stands of live reserve trees and isolated snags. Reserved clumps would be at least 30 feet in diameter.

Where Douglas-fir or windfirm species are present at the crests of ridges they would be retained to duplicate natural linkages.

4. Soil and Water

Soil and Water Conservation Practices, as identified in FSH 2509.22, would be applied to all vegetation treatments and road construction activities. Specific explanations of Best Management Practices (BMPs) as they apply to proposed harvest units are provided in Appendix B, Best Management Practices.

All provisions of the Streamside Management Zone Act will be met.

5. Air Quality

Prescribed burns would be conducted in compliance with the restrictions and standards of the Montana Air Quality Bureau to provide for better smoke dispersion and reduced risk of escaped wildfire.

6. Fire Protection

Fuels management practices and treatments would be employed to reduce accumulation of additional fuels associated with timber harvest to minimize the spread, size, resource impacts, and suppression costs of potential wildfires.

7. Scenery Resources

Treatment units will be designed to meet Visual Quality Objectives. Units boundaries would be irregular in shape and mimic natural stand size, pattern and texture.

Treatment units within the foreground and midground viewing areas of Camas Ridge, the Big Belt Divide, Trails 118 and 140 will be shaped and designed to minimize the visual impact when viewed from these viewing areas.

Stand reserves of untreated vegetation would be retained within treatment areas. Ridges, midslopes, draws and drainages are favored for areas where vegetation would be reserved.

8. Heritage Resources

Heritage Resources will be assessed for their historical significance per evaluation criteria stated in 36 CFR 60.4. Any adverse effects to those heritage resources determined "significant to history" in consultation with the Montana State Historic Preservation Office (MTSHPO) will be mitigated through 36 CFR 800 regulations. The Forest will comply with Sec. 106 of the National Historic Preservation Act (NHPA).

9. Noxious Weeds

Heavy equipment such as skidders, logging and earth moving equipment would be power scrubbed or steam cleaned prior to entering National Forest lands to minimize infestation from other areas.

Noxious weeds would be treated in the area during the life of the project. Continuing treatment to eliminate noxious weeds would be scheduled and conducted when monitoring of noxious weed occurrence indicates the need.

Native species mix would be used for all reseeding efforts.

10. Grazing

Structural improvements such as fences, water developments, and gates damaged during logging activities or road construction would be promptly repaired by the timber sale contractor.

Livestock grazing would be deferred or not allowed just prior to and for two years following prescribed burning activities to ensure successful burning and recovery of the burned area.

11. Contracts

Standard Forest Service Timber Sale Contract Provisions and Standard Specification for Construction of Roads would be applied to all treatment areas and road construction. These contract provisions are project-specific prescriptions that the contractor would perform as protection and mitigation of site resource values. These measures are specified for every treatment area and road contract. Performance bonds are collected and contract administrators are appointed to ensure compliance.

12. Mitigation & Monitoring

All timber harvest and road construction would be monitored by Forest Service representatives to ensure compliance with contractual requirements.

Best Management Practices (BMPs) will be monitored by sale administrators, engineering representatives and resource specialists to assure that BMPs are implemented, as planned, and achieving anticipated effectiveness.

The kind, amount, and distribution of soil disturbance will be measured and assessed against Agency soil quality standards, site preparation specifications, applicable BMPs, and Forest Plan standards and guidelines.

Water quality monitoring at the Atlanta Creek monitoring station will continue. The monitoring site was established in 1983.

Changes in stream channel morphology in the Vermont/Long Gulch watershed will be determined by establishment of at least one permanent cross section in Vermont Creek.

Track counts of elk, deer, marten, lynx and wolverine will be conducted for five years after implementation to assess the effectiveness of road closures in maintaining habitat security for these species.

Fishery response to changes in sediment yield in Atlanta and Vermont Creek will be monitored on identified critical reaches.

The rate of plant recovery and livestock use on units treated by prescribed burning will be monitored annually.

Regeneration surveys will be conducted on planted treatment units and natural regeneration units to determine restocking success on forested treatment units.

Views from sensitive viewing areas, Trails 236 and 258 A-1, and Road 287 A-1 will be evaluated during harvest activities to determine if anticipated visual screening was achieved and road and trail disturbance avoided.

Treatment areas adjacent to inventoried roadless areas will be reviewed prior to sale advertisement to assure that unplanned entries into roadless areas are avoided.

Changes in livestock use patterns due to harvest unit openings and changes in road access will be determined and needs identified for fences or other barriers to reduce any unexpected disturbance from livestock use.

All roads and harvest units will be inspected annually for noxious weed infestations to determine treatment needs.

All burn treatments will be evaluated to determine if expected results were achieved.

Rate of recovery, species composition changes, and changes in production will be determined from establishment of transects and photo points in a representative timber underburn, aspen, and grassland treatment unit.

13. Old Growth Management

As is discussed in Chapter III-19/22 and III-29/30, old growth provides a variety of stand conditions and associated niches in the the ecosystems where it occurs.

In the warm/dry forest types this resource is capable of providing a widely spaced savannah of old growth trees. In this type effective old growth is generally expansive, based on the landform which it is located, and is open grown. This generates a site with sunny and dry conditions, Management objectives with this type of old growth will be to restore stand structure which has been altered by fire suppression and its associated effects.

Cooler and more moist old growth forests provide denser stand structures which are more prone to provide shade and moister conditions. These forests, and stands immediately around them will be managed to favor these more dense stand structures.

B. VEGETATION TREATMENT DESCRIPTIONS

In developing alternatives for the Wagner/Atlanta vegetation restoration project, silvicultural systems are being employed with the intent of manipulating landscapes in an effort to more closely approximate historical processes and vegetative conditions. The application of the various silvicultural systems, after treatment is accomplished, will result in 10-30 percent of targeted stands in untreated reserve patches. Within the treated portion of the stands, individual trees will be reserved from harvest where possible.

Treatment methods include; clearcut, seed tree, shelterwood, commercial thinning, selection harvest, timber burn and grass burn. Slash disposal methods include trample/machine pile, broadcast burn, underburn/ jackpot burn, and lop and scatter.

C. ALTERNATIVE DESCRIPTIONS

This section of the Chapter provides a detailed description of the significant design features of individual alternatives, the projected outputs, and mitigation measures designed to reduce environmental effects.

1. Introduction

In the following information tables for each of the action alternatives, there are figures for each treatment unit of Gross and Net Acres. The reasons for this distinction follows:

- Gross Acres represent the total size of the treatment unit.

- It was recognized that within all the treatment areas, we would manage for "untreated" areas (areas left as is, without burning, tree removal, etc.). These untreated areas would be as follows: for clearcut, seed tree, shelterwood and commercial thin prescriptions a reduction of an average of 25 percent of the gross areas were made to allow for the untreated patches within the treatment area. For example, in a 100 acre shelterwood treatment the resulting stand includes 75 acres where the shelterwood prescription was applied and 25 acres (in various patches and shapes) that would remain as they were prior to treatment of the area. For the selection, timber burn and grass burn treatments a 10 percent reduction was made to allow for the untreated areas.

  These ideas are founded on the basis of ecosystem management; nature left to itself usually creates mosaics on the landscape. The treatment prescriptions allowed for untreated areas in an attempt to bring some of this natural diversity to the proposed treatment areas.

- It is important to note that both the Gross and Net acreages need to be reviewed and considered in the analysis. In some cases, for example soil disturbance, the net acres are relevant because this acreage represents the actual area where soil would be directly impacted by fire or log skidding. In another case, for example visual quality, the gross acres and the resultant mosaic on the landscape needs to be used for analysis because from some vantage point(s) the entire (gross) area is a part of what a viewer would see.

Overall road management descriptions are described in Appendix A.

Acres of treatment by Management Areas for each Alternative is located in Appendix D.

Alternative A:

This alternative represents the Proposed Action described in Chapter I and is the action for which public comment was sought. Treatment areas were selected to target areas that display the greatest departure from the desired vegetative conditions defined during the Big Belts Landscape Analysis. Prescriptions were designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands or reduced plant productivity and species diversity to below natural levels. Target acres were determined to achieve restoration of 50 percent of the forested warm-dry habitats and grassland habitats and 17 percent of the forested cool-moist sites. No other major actions are anticipated in the next 25 years.

Treatments would be designed to include a mosaic of untreated stand reserves of 20-30 percent of the area within the treatment boundaries. The stand reserves would vary in size. Stands would be regenerated by planting 106 acres and natural regeneration of 1456 acres.

Implementation would require construction of approximately 17.3 miles of temporary road and reconstruction of 9.6 miles of existing road. All new roads would be obliterated and returned to natural contour after treatments are completed. Approximately 9.5 miles of the new construction are included within the Cayuse Mountain (3.4 miles), Irish Gulch (4.2 miles) and Camas Creek (1.9 miles) Roadless Areas. Closures of existing roads are proposed on 1.2 miles in Irish Gulch and 0.64 miles in the Camas Creek Roadless Area.

Specific road management activities are described in Appendix A.

Table II-1 lists a unit by unit description of treatments in Alternative A.

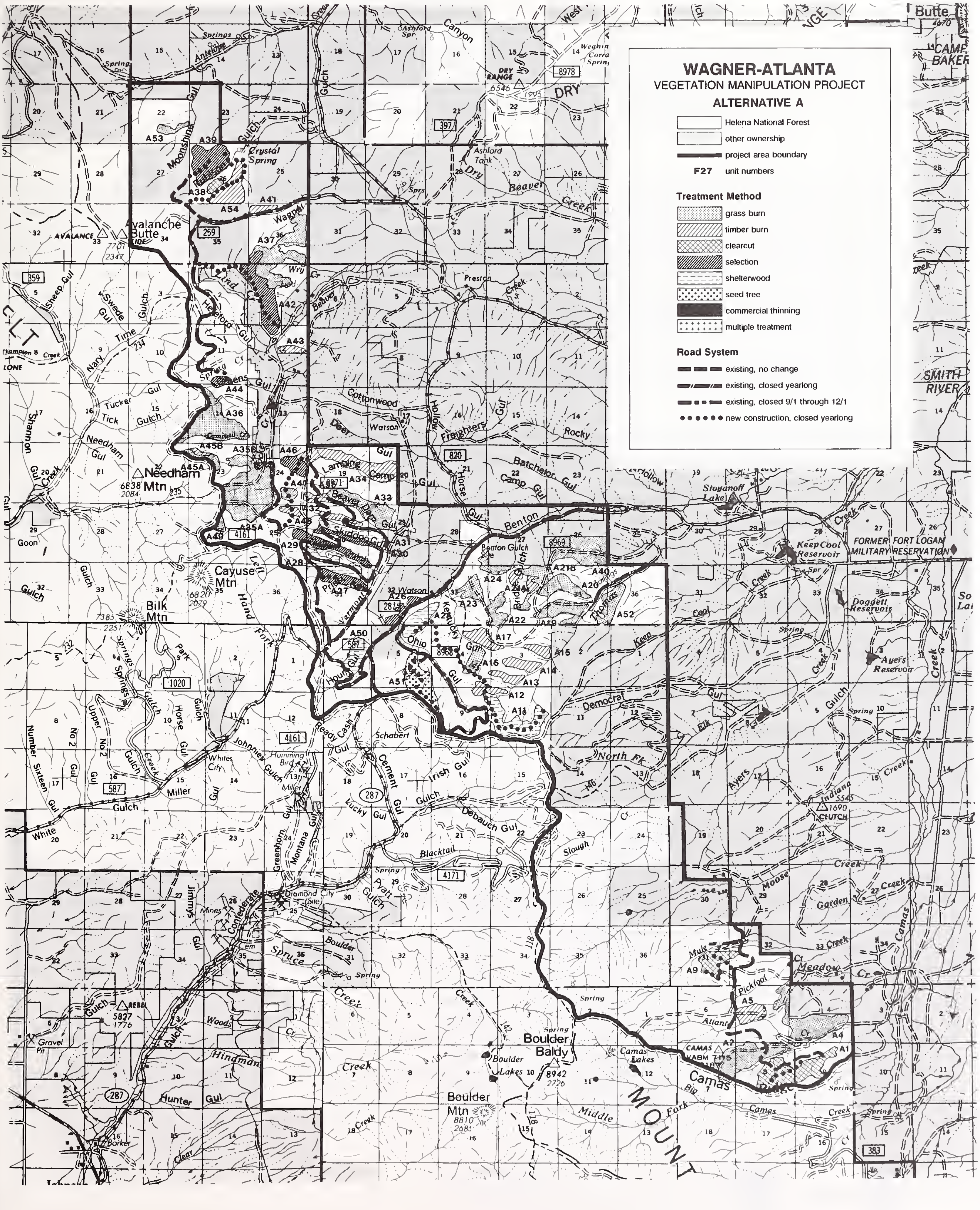
Alternative Map A displays the major features of the Alternative.

TABLE II-1 ALTERNATIVE A

		ACRES					
UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
A1	LODGEPOLE COOL/WET DF	303	227	CAMAS	CLEARCUT	TRACTOR CABLE	T-2
A2	GRASS	273	246	CAMAS	GRASS BURN		L-1
A4	GRASS	273	246	CAMAS	GRASS BURN		L-1
A5	WARM/DRY DF	86	77	CAMAS	TIMBER BURN		L-1
A9	MIXED	97	77	CAMAS	CLEARCUT	CABLE	T-3
A11	LODGEPOLE COOL/WET DF	222	166	IRISH	SHELTERWOOD	CABLE	T-3
A12	WARM/DRY DF	47	42	IRISH	TIMBER BURN		L-1
A13	WARM/DRY DF	48	43	IRISH	TIMBER BURN		L-1
A14	WARM/DRY DF	66	59	IRISH	TIMBER BURN		W-2
A15	WARM/DRY DF	42	38	IRISH	TIMBER BURN		W-2
A16	GRASS	62	56	IRISH	GRASS BURN		T-1
A17	WARM/DRY DF	82	74	IRISH	TIMBER BURN		W-2
A19	GRASS	124	112	IRISH	GRASS BURN		W-2
A20	GRASS	110	99	IRISH	GRASS BURN		L-2
A21	GRASS WARM/DRY DF	113 79	100 66	IRISH IRISH	GRASS BURN TIMBER BURN		L-2
A22	GRASS	80	72	IRISH	GRASS BURN		W-2
A23	GRASS	70	63	IRISH	GRASS BURN		W-2
A24	GRASS	69	62	IRISH	GRASS BURN		W-2
A25	WARM/DRY DF	118	88	IRISH	SHELTERWOOD	CABLE	M-1
A26	WARM/DRY DF	86	77		SELECTION	TRACTOR	M-1
A27	WARM/DRY DF	90	81		SELECTION	TRACTOR	T-1
A28	LODGEPOLE COOL/WET DF	138	104		SHELTERWOOD	TRACTOR	T-1
A29	WARM/DRY DF	123	111		SELECTION	CABLE	T-1
A30	WARM/DRY DF	60	54		SELECTION	TRACTOR	T-1
A31	LODGEPOLE COOL/WET DF	137	103		SHELTERWOOD	TRACTOR	T-1
A32	WARM/DRY DF	48	43		TIMBER BURN		L-1

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
A33	GRASS	235	212		GRASS BURN		L-1
A34	WARM/DRY DF	240	216		TIMBER BURN		T-1
A35	GRASS COOL/WET DF	374 35	337 31	CAYUSE	GRASS BURN SELECTION	 TRACTOR	W-2
A36	GRASS	284	256	CAYUSE	GRASS BURN		L-1
A37	GRASS	303	273		GRASS BURN		L-1
A38	WARM/DRY DF	23	17	CAYUSE	CLEARCUT	CABLE	T-5
A39	WARM/DRY DF	193	174	CAYUSE	SELECTION	TRACTOR	T-5
A40	GRASS	281	253	IRISH	GRASS BURN		L-2
A41	WARM/DRY DF	35	32		TIMBER BURN		L-1
A42	WARM/DRY DF	210	189		SELECTION	TRACTOR	T-1
A43	WARM/DRY DF	35	32		TIMBER BURN		T-1
A44	WARM/DRY DF	37	33		SELECTION	CABLE	T-5
A45	GRASS WARM/DRY DF	 62	46 10	CAYUSE	GRASS BURN TIMBER BURN		L-1
A46	WARM/DRY DF	65	58		SELECTION	CABLE	L-1
A47	GRASS	37	33		GRASS BURN		T-1
A48	WARM/DRY DF	31	28		TIMBER BURN		T-1
A49	WARM/DRY DF	79	71	CAYUSE	GRASS BURN		W-2
A50	COOL/WET DF	104	78		SHELTERWOOD	CABLE	T-5
A51	LODGEPOLE COOL/WET DF	102 102	76 76		SEED TREE SHELTERWOOD	CABLE CABLE	T-1
A52	GRASS	106	95	IRISH	GRASS BURN		L-2
A53	GRASS	40	36	CAYUSE	GRASS BURN		T-5
A54	WARM/DRY DF	150	135	CAYUSE	TIMBER BURN		L-1
A55	WARM/DRY DF	90	81		TIMBER BURN		L-1

MAP II-1 ALTERNATIVE A



Alternative B:

Under this alternative, none of the actions identified in the Proposed Action would occur. This alternative responds to those concerns that oppose any additional vegetative manipulation or road construction in the Implementation Area and provides a baseline to compare the amount and rate of change of each of the action alternatives.

Alternative C:

Alternative C was designed to meet the purpose and need while addressing internal and public concerns of elk vulnerability during the hunting season (Issue 1). In addition, it addresses forest health by treating some stands with heavy mortality. Treatment areas and road construction and existing road closures are located and designed to increase the level of security for the affected elk herd unit during the big game hunting season. Security areas were determined using the Hillis security area concept (Defining Elk Security: The Hillis Paradigm). Hillis defines security as areas of at least 250 acres which are 40 percent cover and more than one-half mile from an open road. This standard was used for areas south of Slough Creek except that cover is increased to 50 percent. North of Slough Creek, canopy closure will be provided where possible to improve big game security and to compensate for the more open nature of the landscape. Prescriptions would also be designed to retain 50 percent cover, where possible, and to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands.

Untreated reserve patches would be included within all prescriptions. Individual reserve trees would also be retained. Approximately 20-30 percent of the treatment areas would be retained in reserve patches. Stands would be regenerated by planting approximately 285 acres and natural regeneration of 1075 acres.

For Alternative C, approximately 9.0 miles of road construction and 7.0 miles of road reconstruction would be needed. No new roads are proposed within either the Cayuse or Irish Gulch Roadless Areas. An estimated 1.2 miles of temporary road would be needed in the Camas Creek Roadless Area. All new roads would be closed to motorized use after project implementation is completed. About 22 miles of existing roads will be closed yearlong and 11 miles will be closed during hunting season. Closures of existing roads in the Roadless Areas are proposed in Cayuse (0.4 miles), Irish Gulch (4.3 miles) and Camas Creek (5.9 miles).

Specific road management actions are described in Appendix A.

Table II-2 lists a unit by unit description of treatments in Alternative C.

Alternative Map C displays the major features of the Alternative.

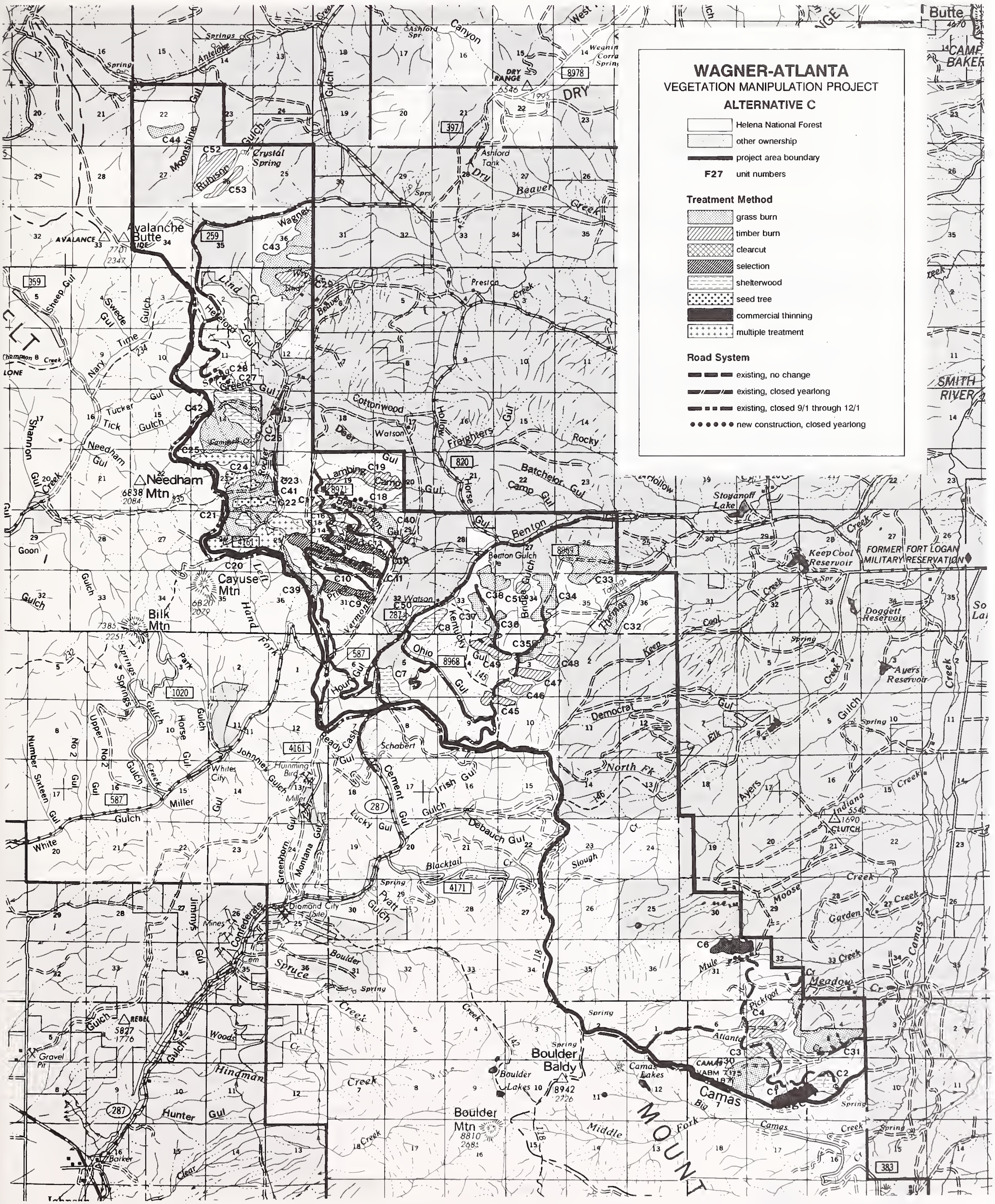
TABLE II-2 ALTERNATIVE C

		ACRES					
UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
C1	LODGEPOLE	90	68	CAMAS	THIN	TRACTOR	T-2
C2	COOL/WET DF	67	50	CAMAS	SHELTERWOOD	TRACTOR	T-2
C3	LODGEPOLE	104	78	CAMAS	CLEARCUT	CABLE	T-3
C4	WARM/DRY DF	95	86	CAMAS	TIMBER BURN		L-1
C5	LODGEPOLE	15	11	CAMAS	CLEARCUT	TRACTOR	T-3
C6	LODGEPOLE	87	65	CAMAS	THIN	TRACTOR	T-3

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
C7	COOL/WET DF	145	109		SHELTERWOOD	CABLE/TRACTOR	T-5
C8	WARM/DRY DF	98	74	IRISH	SHELTERWOOD	CABLE	M-1
C9	WARM/DRY DF	80	72		SELECTION	CABLE	T-1
C10	LODGEPOLE COOL/WET DF	27	20		SHELTERWOOD	TRACTOR	T-1
C11	WARM/DRY DF	158	142		SELECTION	CABLE	T-1
C12	WARM/DRY DF	61	55		SELECTION	CABLE	T-1
C13	LODGEPOLE COOL/WET DF	23	17		SHELTERWOOD	TRACTOR	T-3
C14	LODGEPOLE COOL/WET DF	32	24		SHELTERWOOD	TRACTOR	T-3
C15	LODGEPOLE WARM/DRY DF	44	40		TIMBER BURN		L-1
C16	LODGEPOLE COOL/WET DF	24	18		SHELTERWOOD	CABLE	L-1
C17	WARM/DRY DF	90	81		TIMBER BURN		L-1
C18	LODGEPOLE COOL/WET DF	56	42		SHELTERWOOD	CABLE	L-1
C19	WARM/DRY DF	138	124		TIMBER BURN		T-1
C20	LODGEPOLE COOL/WET DF	42 280	32 210	CAYUSE	SEED TREE SHELTERWOOD	TRACTOR CABLE	T-1
C21	COOL/WET DF	36	27	CAYUSE	SHELTERWOOD	HELICOPTER	W-2
C22	LODGEPOLE COOL/WET DF	64	48	CAYUSE	SEED TREE	HELICOPTER	W-2
C23	LODGEPOLE COOL/WET DF	23	17	CAYUSE	SEED TREE	HELICOPTER	W-2
C24	LODGEPOLE COOL/WET DF	24	18	CAYUSE	SEED TREE	HELICOPTER	T-1
C25	LODGEPOLE COOL/WET DF	31 66	23 50	CAYUSE CAYUSE	CLEARCUT SHELTERWOOD	HELICOPTER	L-1
C26	LODGEPOLE COOL/WET DF	95	71	CAYUSE	SHELTERWOOD	HELICOPTER	L-1
C27	LODGEPOLE COOL/WET DF	78	58		SHELTERWOOD	HELICOPTER	T-5
C28	WARM/DRY DF	45	41		SEED TREE	TRACTOR	T-5
C29	WARM/DRY DF	84	76		TIMBER BURN		L-1
C30	GRASS	187	168	CAMAS	GRASS BURN		L-1

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
C31	GRASS	244	220	CAMAS	GRASS BURN		L-1
C32	GRASS	105	94	IRISH	GRASS BURN		W-2
C33	GRASS	278	250	IRISH	GRASS BURN		L-2
C34	GRASS	114	103	IRISH	GRASS BURN		L-2
C35	GRASS	73	66	IRISH	GRASS BURN		W-2
C36	GRASS	51	46	IRISH	GRASS BURN		W-2
C37	GRASS	42	38	IRISH	GRASS BURN		W-2
C38	GRASS	84	76	IRISH	GRASS BURN		W-2
C39	GRASS	92	83		GRASS BURN		T-1
C40	GRASS	129	116		GRASS BURN		L-1
C41	GRASS	388	349	CAYUSE	GRASS BURN		W-2
C42	GRASS	333	300	CAYUSE	GRASS BURN		L-1
C43	GRASS	336	302	CAYUSE	GRASS BURN		L-1
C44	GRASS	51	46	CAYUSE	GRASS BURN		T-5
C45	WARM/DRY DF	49	44	IRISH	TIMBER BURN		L-1
C46	WARM/DRY DF	48	43	IRISH	TIMBER BURN		L-1
C47	WARM/DRY DF	63	57	IRISH	TIMBER BURN		W-2
C48	WARM/DRY DF	34	31	IRISH	TIMBER BURN		W-2
C49	WARM/DRY DF	76	68	IRISH	TIMBER BURN		W-2
C50	WARM/DRY DF	60	54		SELECTION	TRACTOR	M-1
C51	WARM/DRY DF	24	22	IRISH	TIMBER BURN		W-2
C52	WARM/DRY DF	159	143	CAYUSE	TIMBER BURN		T-5
C53	WARM/DRY DF	54	49	CAYUSE	TIMBER BURN		T-5

MAP II-2 ALTERNATIVE C



Alternative D:

Alternative D was developed to respond to concerns expressed for maximizing monetary returns of project implementation (Issue 2). The alternative was developed to treat total acres comparable to the acres contained in the Proposed Action. To maximize monetary returns the alternative treats those forested stands that provide the greatest monetary returns at the least cost for implementing. Stands proposed for harvest generally are capable of regeneration by natural means, tractor yarding and dozer slash treatment and site preparation. Stands requiring hand planting, broadcast burning, cable yarding and other costly features are not favored in this alternative.

Nonforested acres selected for burning treatment were identified as areas most in need of treatment to increase production and vigor and are reasonably accessible for treatment.

Vegetation treatment areas would contain untreated stand reserves that occupy 20-30 percent of the unit. The size of the reserve patches would generally increase as the unit size increases.

Stands would be regenerated by planting approximately 233 acres and natural regeneration of approximately 1954 acres.

Implementation of Alternative D would require construction of 25.6 miles of road and reconstruction of 15.0 miles of existing road. Construction of 17.9 miles of temporary roads would be required in the Cayuse (4.8 miles), Irish Gulch (7.9 miles), and Camas Creek (5.2 miles) Roadless Areas. About 1.1 miles of existing road in the Cayuse Roadless Area and 4.4 miles of existing road in the Long Gulch and Ohio Gulch areas would be permanently closed. An additional 7.0 miles of road 4161 will be closed during hunting season.

Specific road management activities are described in Appendix A.

Table II-3 lists a unit by unit description of treatments in Alternative D.

Alternative Map D displays the major features of the Alternative.

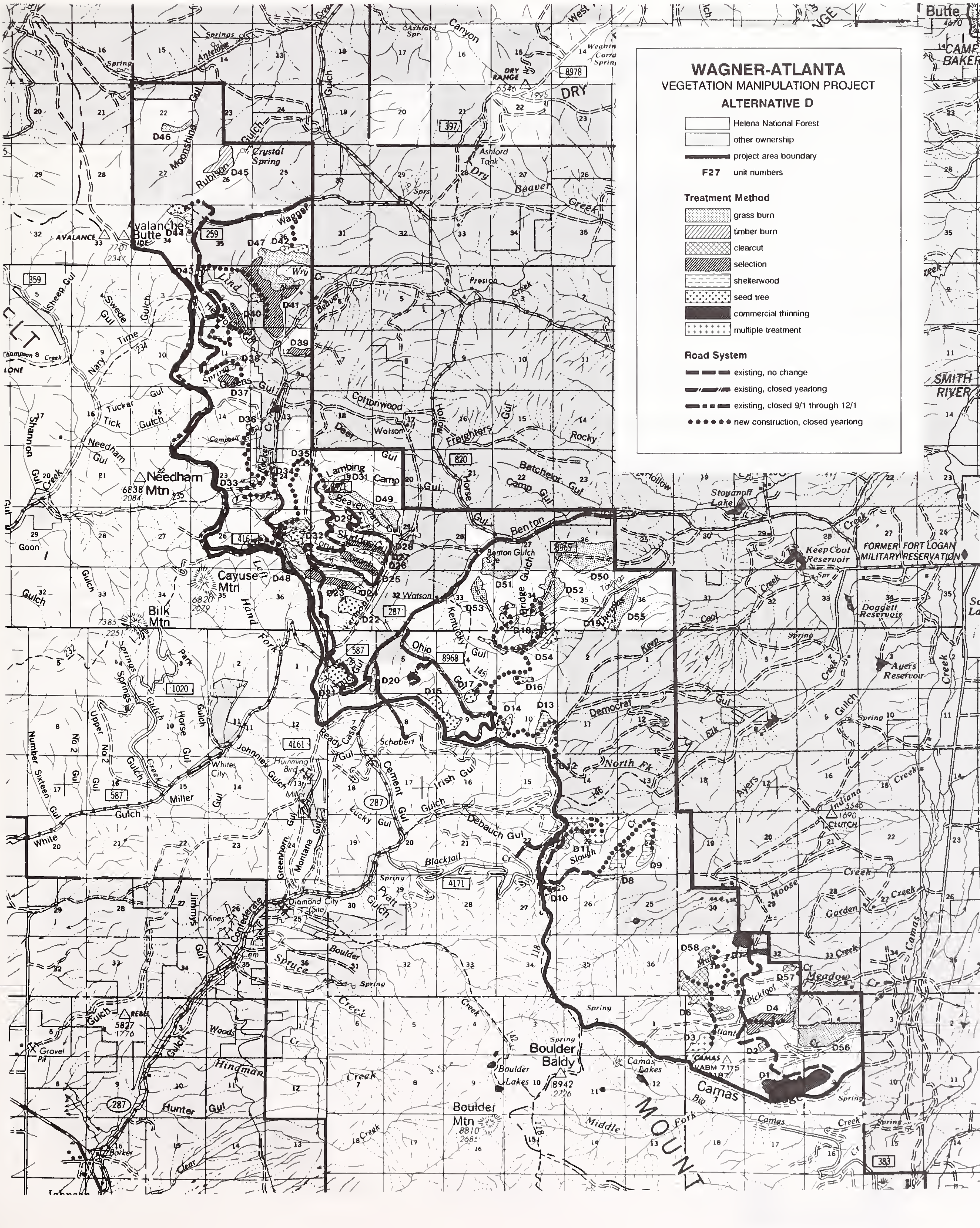
TABLE II-3 ALTERNATIVE D

		ACRES					
UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
D1	LODGEPOLE COOL/WET DF	53 140	40 105	CAMAS CAMAS	THIN	TRACTOR	T-2
D2	LODGEPOLE	12	9	CAMAS	CLEARCUT	TRACTOR	L-1
D3	LODGEPOLE	92	69	CAMAS CAMAS	CLEARCUT SEED TREE	TRACTOR	T-3
D4	WARM/DRY DF WARM/DRY DF	73 30	64 22	CAMAS CAMAS	SELECTION SEED TREE	TRACTOR TRACTOR	L-1
D6	LODGEPOLE	154	116	CAMAS	CLEARCUT	TRACTOR	T-3
D7	LODGEPOLE	59	44	CAMAS	THIN	TRACTOR	T-3
D8	LODGEPOLE COOL/WET DF	52	39	CAMAS	SHELTERWOOD	TRACTOR	L-2
D9	COOL/WET DF	47	35	CAMAS	SHELTERWOOD	TRACTOR	T-2
D10	COOL/WET DF	28	21		SEED TREE	TRACTOR	T-3

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
D11	WARM/DRY DF LODGEPOLE 1 COOL/WET DF	80 81 84	72 61 61		CLEARCUT SEED TREE	CABLE TRACTOR	M-1
D12	COOL/WET DF	16	12	IRISH	SEED TREE	TRACTOR	L-1
D13	LODGEPOLE COOL/WET DF	62	46	IRISH	SHELTERWOOD	CABLE	W-2
D14	COOL/WET DF	38	28	IRISH	SEED TREE	CABLE TRACTOR	T-3
D15	COOL/WET DF	111	83		SEED TREE	CABLE TRACTOR	T-1
D16	WARM/DRY DF	23	17	IRISH	SEED TREE	CABLE	L-1
D17	WARM/DRY DF	34	22	IRISH	SELECTION	CABLE	L-1
D18	WARM/DRY DF	117	108	IRISH	SEED TREE	CABLE TRACTOR	W-2
D19	WARM/DRY DF	34	26	IRISH	SELECTION	TRACTOR	W-2
D20	COOL/WET DF	22	16		SHELTERWOOD	CABLE	L-1
D21	LODGEPOLE COOL/WET DF	119	89		SEED TREE	TRACTOR	L-1
D22	COOL/WET DF	66	50		SEED TREE	TRACTOR	T-1
D23	WARM/DRY DF	38	34		SELECTION	TRACTOR	T-1
D24	LODGEPOLE COOL/WET DF	158	118		SHELTERWOOD	TRACTOR	T-1
D25	WARM/DRY DF	46	41		SELECTION	TRACTOR	T-1
D26	LODGEPOLE COOL/WET DF	22	16		SEED TREE	TRACTOR	T-1
D27	WARM/DRY DF	33	30		SELECTION	TRACTOR	T-1
D28	LODGEPOLE COOL/WET DF	118	88		SEED TREE	TRACTOR	T-1
D29	COOL/WET DF	34	26		SEED TREE	TRACTOR	L-1
D30	WARM/DRY DF	11	8		SELECTION	TRACTOR	T-1
D31	LODGEPOLE COOL/WET DF	25	19		SEED TREE	CABLE	T-1
D32	COOL/WET DF	131 70	98 53	CAYUSE	SEED TREE CLEARCUT	TRACTOR TRACTOR	T-1
D33	COOL/WET DF	19 39	15 30	CAYUSE CAYUSE	SHELTERWOOD SEED TREE	TRACTOR TRACTOR	W-2
D34	WARM/DRY DF	20	15	CAYUSE	SELECTION	TRACTOR	W-2

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
D35	WARM/DRY DF	9	7		SEED TREE	TRACTOR	L-1
D36	WARM/DRY DF	13	10	CAYUSE	SELECTION	TRACTOR	T-1
D37	WARM/DRY DF	30	27		SELECTION	TRACTOR	T-5
D38	WARM/DRY DF	12	9		SHELTERWOOD	CABLE	T-5
D39	WARM/DRY DF	25	22		SELECTION	TRACTOR	T-5
D40	WARM/DRY DF	46	41		SELECTION	TRACTOR	T-5
D41	WARM/DRY DF	257	231		SELECTION	TRACTOR	T-5
D42	WARM/DRY DF	27	20		SEED TREE	TRACTOR	L-1
D43	WARM/DRY DF	14	10		SEED TREE	TRACTOR	T-5
D44	WARM/DRY DF	55	41	CAYUSE	SEED TREE SHELTERWOOD	TRACTOR	T-5
D45	WARM/DRY DF	80	70	CAYUSE	TIMBER BURN	TRACTOR	T-5
D46	GRASS	51	46	CAYUSE	GRASS BURN		T-5
D47	GRASS	293	264		GRASS BURN		L-1
D48	GRASS	43	39	CAYUSE	GRASS BURN		T-3
D49	GRASS	115	104		GRASS BURN		L-1
D56	GRASS	267	240	IRISH	GRASS BURN		L-2
D51	GRASS	50	75	IRISH	GRASS BURN		W-2
D52	GRASS	113	102	IRISH	GRASS BURN		L-2
D53	GRASS	50	75	IRISH	GRASS BURN		W-2
D51	GRASS	81	55	IRISH	GRASS BURN		W-2
D56	GRASS	81	73	IRISH	GRASS BURN		W-2
D56	GRASS	245	221	CAMAS	GRASS BURN		L-1
D57	LODGEPOLE	17	13	CAMAS	CLEARCUT	TRACTOR	T-3
D58	LODGEPOLE	32	24	CAMAS	CLEARCUT	TRACTOR	T-3

MAP II-3 ALTERNATIVE D



Alternative E: Preferred Alternative

Alternative E responds to those concerns for avoiding impacts to inventoried roadless areas (Issue 3). No roading or vegetative treatments are proposed within the Roadless Areas. Treatments were selected outside of the roadless areas with an attempt to still achieve the target acres determined for the Implementation Area and designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands.

Areas treated by silvicultural prescription would leave 20-30 percent of the total treatment area in stand reserves. Stands would be regenerated by approximately 138 acres of planting and 1861 acres of natural regeneration. Areas to be treated are more concentrated and there is a reduction of the number of acres to be treated.

Approximately 14.8 miles of road construction and 14.5 miles of reconstruction would be needed to implement this alternative. An estimated 14.5 miles of existing roads would be closed yearlong in the Wagner Gulch, Long Gulch, Ohio Gulch, and Atlanta Creek areas. An additional 7 miles of Road 4161 will be closed to motorized vehicles during hunting season.

Specific road management activities are described in Appendix A.

Table II-4 lists a unit by unit description of treatments in Alternative E.

Alternative Map E displays the major features of the Alternative.

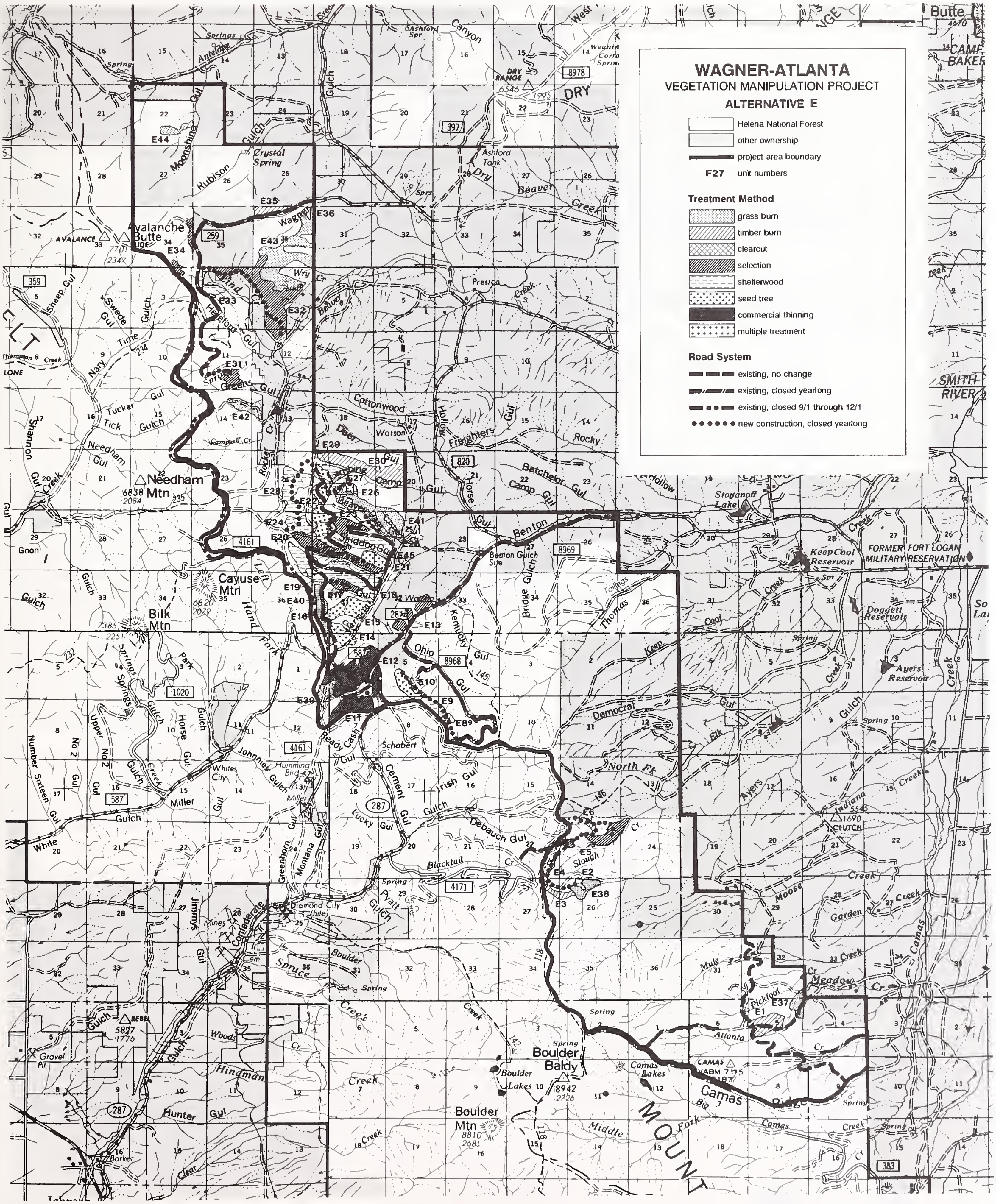
TABLE II-4 ALTERNATIVE E

		ACRES					
UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
E1	WARM/DRY DF	97	87		TIMBER BURN		L-1
E2	COOL/WET DF	15	12		SHELTERWOOD	TRACTOR	L-2
E3	COOL/WET DF	27	20		CLEARCUT	TRACTOR	M-1
E4	COOL/WET DF	21	16		SEED TREE	TRACTOR	M-1
E5	WARM/DRY DF	113	102		SELECTION	CABLE	T-2
E6	COOL/WET DF	26 25	19 19		SEED TREE CLEARCUT	TRACTOR TRACTOR	M-1
E7	LODGEPOLE COOL/WET DF	49	44		SELECTION	CABLE	
E8	LODGEPOLE	23	17		SEED TREE	TRACTOR	T-1
E9	LODGEPOLE COOL/WET DF	60	45		SHELTERWOOD	TRACTOR	T-1
E10	LODGEPOLE COOL/WET DF	63	47		SEED TREE	TRACTOR	T-1
E11	COOL/WET DF	150	112		THIN	TRACTOR	T-1
E12	COOL/WET DF	235	176		THIN	TRACTOR	T-1

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
E13	WARM/DRY DF	93	84		SELECTION	TRACTOR	M-1
E14	LODGEPOLE COOL/WET DF	77	58		SEED TREE	TRACTOR	T-1
E15	LODGEPOLE COOL/WET DF	77	58		SEED TREE	TRACTOR	T-1
E16	COOL/WET DF	53	40		SEED TREE	CABLE	T-1
E17	WARM/DRY DF	43	39		SELECTION	TRACTOR	T-1
E18	COOL/WET DF	63	47		SHELTERWOOD	TRACTOR	T-1
E19	LODGEPOLE COOL/WET DF	238	178		SHELTERWOOD	TRACTOR	T-1
E20	WARM/DRY DF	154	139		SELECTION	CABLE	T-1
E21	LODGEPOLE COOL/WET DF	67	50		SEED TREE	TRACTOR	T-1
E22	COOL/WET DF	190	142		SEED TREE	TRACTOR CABLE	T-1
E23	WARM/DRY DF	80	79		SELECTION	CABLE	L-1
E24	COOL/WET DF	73	55		SHELTERWOOD	TRACTOR	T-1
E25	WARM/DRY DF	71	64		TIMBER BURN		L-1
E26	LODGEPOLE COOL/WET DF	29	22		SEED TREE	TRACTOR	T-1
E24	WARM/DRY DF	18	16		TIMBER BURN		T-1
E28	COOL/WET DF	139	104		SHELTERWOOD	TRACTOR/CABLE	T-1
E29	COOL/WET DF	36	27		SHELTERWOOD	CABLE	T-1
E30	WARM/DRY DF	223	201		TIMBER BURN		T-1
E31	WARM/DRY DF	50	45		SELECTION	TRACTOR	T-5
E32	WARM/DRY DF	329	41 255		SELECTION TIMBER BURN	TRACTOR	T-5
E34	WARM/DRY DF	44	40		SELECTION	TRACTOR	T-5
E35	WARM/DRY DF	48	43		TIMBER BURN		L-1
E36	WARM/DRY DF	11	8		SHELTERWOOD	TRACTOR	T-5
E37	GRASS	43	39		GRASS BURN		L-1
E38	GRASS	54	49		GRASS BURN		L-2
E39	GRASS	54	49		GRASS BURN		T-1
E40	GRASS	106	95		GRASS BURN		T-1

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
E41	GRASS	151	136		GRASS BURN		L-1
E42	GRASS	64	58		GRASS BURN		T-5
E43	GRASS	305	275		GRASS BURN		L-1
E44	GRASS	38	34		GRASS BURN		T-5
E45	COOL/WET DF	111	83		SHELTERWOOD	TRACTOR	T-1
E46	WARM/DRY DF	43	39		SELECTION	TRACTOR	

MAP II-4 ALTERNATIVE E



Alternative F:

This alternative treats only those areas that do not require new road construction. It responds to those concerns expressing opposition to any new road construction (Issue 4). Helicopter yarding is proposed for stands needing treatment that are within 7000 feet of existing roads and not accessible by conventional wheel, track, or cable harvest systems. Stands not accessible from existing roads or helicopter yarding are not considered available for treatment with this alternative.

Prescriptions were designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands. Untreated reserve patches would represent 20-30 percent of treatment areas. Stands would be regenerated by natural regeneration of approximately 2717 acres.

No road construction is planned. Reconstruction of about 8.6 miles of existing road would be needed. About 14 miles of existing roads would be closed to motorized uses yearlong in the Wagner Gulch, Ohio Gulch and Atlanta Creek areas. An additional 7 miles of road 4161 will be closed during hunting season.

Specific road management activities are described in Appendix A.

Table II-5 lists a unit by unit description of treatments in Alternative F.

Alternative Map F displays the major features of the Alternative.

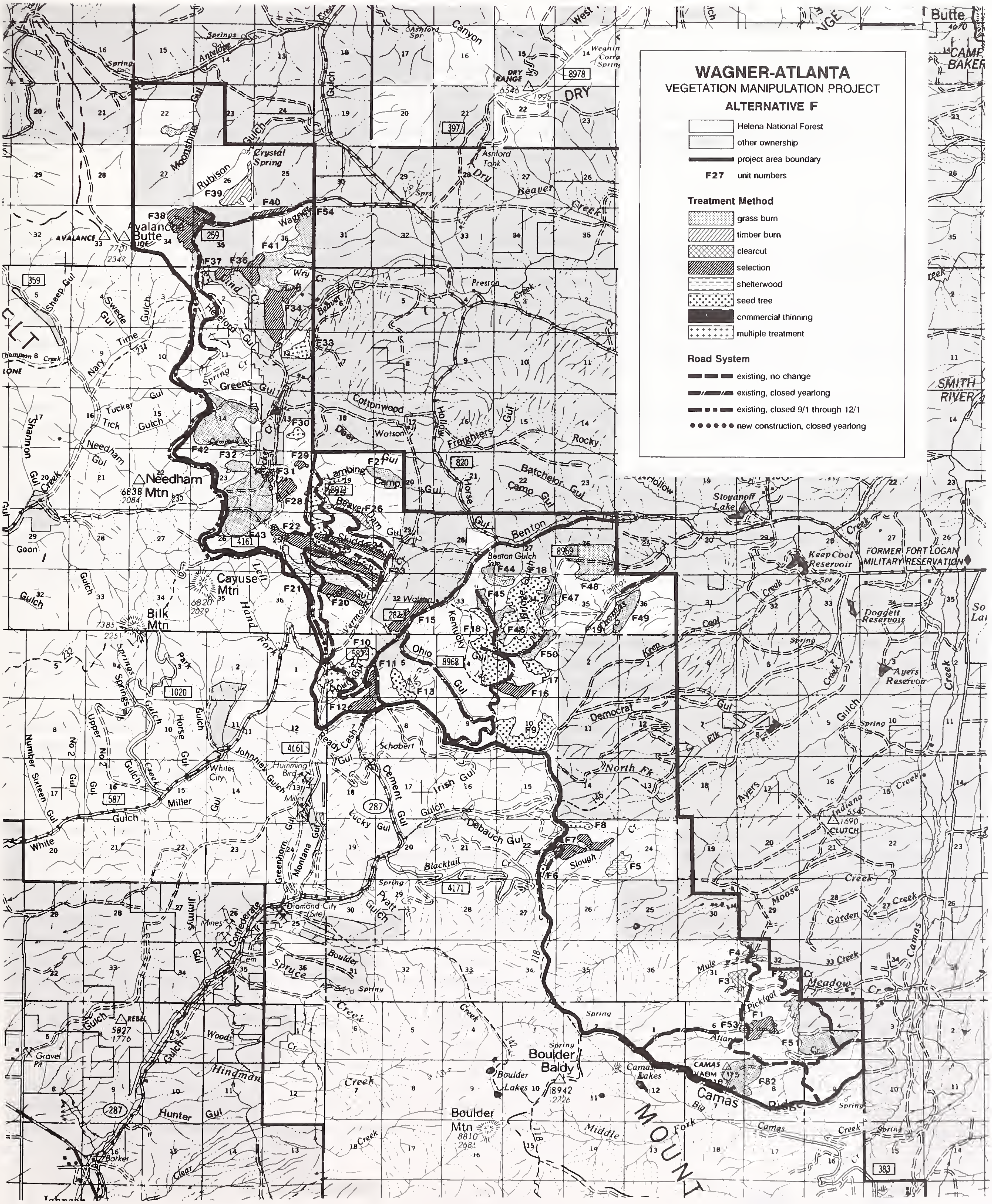
TABLE II-5 ALTERNATIVE F

		ACRES					
UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
F1	WARM/DRY DF	69	62	CAMAS	SELECTION	TRACTOR	L-1
F2	LODGEPOLE	18	14	CAMAS	CLEARCUT	HELICOPTER	T-3
F3	LODGEPOLE COOL/WET DF	42	32	CAMAS	CLEARCUT	TRACTOR	T-3
F4	LODGEPOLE	27	20	CAMAS	CLEARCUT	TRACTOR	T-3
F5	LODGEPOLE COOL/WET DF	61	46	CAMAS	SHELTERWOOD	HELICOPTER	L-2
F6	LODGEPOLE	17	13		SEED TREE	TRACTOR	M-1
F7	WARM/DRY DF	112	101		SELECTION	HELICOPTER	M-1
F8	LODGEPOLE COOL/WET DF	37	28		SEED TREE	HELICOPTER	M-1
F9	COOL/WET DF	194	146	IRISH	SEED TREE	HELICOPTER TRACTOR	W-2
F10	COOL/WET DF	122 122	92 91		CLEARCUT SEED TREE	TRACTOR TRACTOR	T-1
F11	COOL/WET DF	24	22		SELECTION	CABLE	T-1
F12	WARM/DRY DF	57	51		SELECTION	TRACTOR	T-1

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
F13	WARM/DRY DF	64	48		SEED TREE	HELICOPTER	T-1
F15	WARM/DRY DF	92	83		SELECTION	CABLE	M-1
F16	WARM/DRY DF	66	59	IRISH	SELECTION	HELICOPTER	L-1
F17	WARM/DRY DF	48	36	IRISH	SEED TREE	HELICOPTER	W-2
F18	WARM/DRY DF	411 210	308 233	IRISH IRISH	SEED TREE SELECTION	HELICOPTER HELICOPTER	W-2
F19	WARM/DRY DF	41	31	IRISH	TIMBER BURN		W-2
F20	WARM/DRY DF	73	66		SELECTION	TRACTOR	T-1
F21	LODGEPOLE COOL/WET DF	280	210	CAYUSE	SHELTERWOOD	TRACTOR	T-1
F22	WARM/DRY DF	187	168	CAYUSE	SELECTION	CABLE	T-1
F23	LODGEPOLE COOL/WET DF	40	30		SEED TREE	TRACTOR	T-1
F24	WARM/DRY DF	64	58		SELECTION	CABLE	T-1
F25	LODGEPOLE COOL/WET DF	202	152		SEED TREE	CABLE TRACTOR HELICOPTER	T-1
F26	WARM/DRY DF	71	64		TIMBER BURN		L-1
F27	GRASS	78	70		GRASS BURN		T-1
F28	WARM/DRY DF	51	46	CAYUSE	SELECTION	HELICOPTER	T-1
F29	WARM/DRY DF	11	10		SELECTION	TRACTOR	L-1
F30	WARM/DRY DF	29	22		SEED TREE	HELICOPTER/ TRACTOR	L-1
F31	WARM/DRY DF	20	18	CAYUSE	SELECTION	HELICOPTER/ TRACTOR	L-1
F32	LODGEPOLE COOL/WET DF	30	22	CAYUSE	SHELTERWOOD	HELICOPTER/ TRACTOR	L-1
F33	COOL/WET DF	62	46		SEED TREE	HELICOPTER	T-1
F34	WARM/DRY DF	181	163		SELECTION	HELICOPTER	T-1
F36	WARM/DRY DF	109	98		SELECTION	HELICOPTER/ TRACTOR	T-1
F37	WARM/DRY DF	30	22		SEED TREE	TRACTOR	T-1
F38	WARM/DRY DF	80	72	CAYUSE	SELECTION	TRACTOR	T-5
F39	WARM/DRY DF	106	95	CAYUSE	TIMBER BURN		L-1

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
F40	WARM/DRY DF	32	29		SELECTION	CABLE	L-1
F41	GRASS	305	275		GRASS BURN		L-1
F42	GRASS	353	318	CAYUSE	GRASS BURN		L-1
F43	GRASS	486	437	CAYUSE	GRASS BURN		L-1
F44	GRASS	66	59	IRISH	GRASS BURN		W-2
F45	GRASS	42	38	IRISH	GRASS BURN		W-2
F46	GRASS	53	48	IRISH	GRASS BURN		W-2
F47	GRASS	102	92	IRISH	GRASS BURN		L-2
F48	GRASS	269	242	IRISH	GRASS BURN		L-2
F49	GRASS	96	86	IRISH	GRASS BURN		L-2
F50	GRASS	76	68	IRISH	GRASS BURN		W-2
F51	GRASS	230	207	CAMAS	GRASS BURN		L-1
F52	GRASS	200	180	CAMAS	GRASS BURN		L-1
F53	GRASS	42	38	CAMAS	GRASS BURN		L-1
F54	GRASS	15	11		GRASS BURN		L-1
F55	GRASS	51	46	CAYUSE	GRASS BURN		T-5

MAP II–5 ALTERNATIVE F



D. ALTERNATIVES IDENTIFIED BUT ELIMINATED FROM DETAILED STUDY

Three other alternatives were developed but were eliminated from detailed analysis. During the preliminary analysis of these alternatives, the Interdisciplinary Team concluded that none warranted detailed analysis. Following is a description of these alternatives and the reasoning for dismissing them from detailed analysis.

Alternative G:

This alternative focused primarily on the issue of providing for and sustaining healthy forested and nonforested systems (Issue 5) but targeted different stands than those selected in the Proposed Action. The objective surfaced from Forest Service resource specialist's concerns to focus more treatment of forested stands exhibiting current mortality and insect and disease activity. Areas selected for treatment in this alternative proposed commercial harvest of more stands where current and foreseeable mortality could be recovered while they still had commercial value. Stands of known old growth character were not proposed for treatment. The location of treatment units was also strongly influenced by big game security needs.

After the alternative was developed it was obvious that it differed very little from Alternative C. Because the alternative was virtually a duplication of Alternative C, the Team decided that Alternative C adequately responded to the Forest Health Issue.

Alternative H:

Alternative H was developed to respond to the issue of a traditional approach to vegetation management with a primary emphasis on timber harvest and more frequent entries. Target treatment acres were approximately half that in the Proposed Action but two entries within the next 25 years were anticipated to meet the total needs for the 25 year period. Restoration areas within the forested stands were limited to 40 acres.

This alternative responded to concerns related to the nontraditional large number of acres proposed for treatment in the Proposed Action (Issue 6). The alternative provided a base of comparison between achieving the purpose and need of the project through traditional means versus application of nontraditional ecosystem management principles.

The Alternative proposed restoration of 2065 acres of forested habitats and 824 acres of grassland. Treatments consisted of 1103 acres of clearcut, 34 acres of seedtree, 172 acres of shelterwood, 756 acres of commercial thinning and 824 acres of grassland prescribed burning. Treatments were designed to include a mosaic of untreated reserve patches within the treatment unit boundaries.

Silvicultural treatments would utilize both tractor and cable harvest systems. Site preparation would consist of machine (dozer or excavator) piling, broadcast burning, underburning, yarding unmerchantable material, and yarding with tops attached. Stands would be regenerated by planting or natural regeneration.

Implementation would require construction of approximately 12 miles of temporary road and reconstruction of 15 miles of existing road. All new roads would be obliterated and returned to natural contour after treatments are completed. Most of the new construction and about half of the reconstruction would be included within the Cayuse Mountain, Irish Gulch and Camas Creek Roadless Areas. An additional 5 miles of existing road was proposed for either seasonal or permanent closure. The closures include a hunting season area closure north of Benton to Rubison Creeks and permanent closures in the Long Gulch area. The majority of these closures were designed for big game benefits.

The majority of the vegetative treatments would be in the Cayuse, Camas and Irish Gulch Roadless Areas.

As the alternative was being finalized it became apparent to the IDT that traditional methods of locating and designing treatment units and frequency of entries required to provide needed treatments was not responsive to the maintenance

and sustainability of naturally occurring ecosystems in the Implementation Area. The desired conditions defined during the Big Belts landscape analysis clearly revealed that traditional methods of treating vegetation in the Implementation Area would not maintain sustainable forest and grassland systems. It was concluded that this approach was much less consistent with ecosystem management principles than other alternatives. Although the IDT recognized that displaying the environmental effects of traditional treatment approaches would provide a comparison of traditional and non-traditional management, it did not believe that the value of the comparison warranted the additional effort required to perform detailed analysis of the alternative.

Alternative I:

Alternative I treats essentially the same areas as the Proposed Action but utilizes prescribed fire as the only vegetative treatment to achieve the desired vegetative conditions. The alternative responds to those comments supportive of the purpose and need for the Proposed Action but opposed to additional roading and commercial timber harvesting (Issue 7).

Alternative I was eliminated from detailed study primarily because of the conflict with the Forest Plan goals of using commodities from suitable lands. This conflict, coupled with the high cost of implementation, led to the conclusion that the alternative did not warrant detailed consideration.

E. COMPARISON OF ALTERNATIVES

This section presents a comparison of alternatives by issue. It provides a comparative summary of how the alternatives respond to the purpose and need for action, response to the significant issues, the projected outputs and other environmental effects that may influence alternative selection. Based on this discussion the deciding officer and the public should be able to see why some alternatives affect resources differently than others, and what the trade-offs are between alternatives; that is, provide "a clear basis for choice among options by the decision maker and the public".

ISSUE 1: The Effects of Vegetative Treatments and Road Construction on Elk Vulnerability During Hunting Season.

The amount and distribution of secure habitat during the hunting season is the best known measure of elk vulnerability. The alternatives provide different levels of security due to the variations in amount, method, and location of vegetative treatments and the number, distribution, and effectiveness of motorized vehicle closures.

Alternative D is estimated to provide security over 27 percent of the elk herd unit. This is below the recommended minimum of 30 percent. A high rate of displacement of elk from public to private lands would probably occur under these conditions. Early season harvest of bull elk should be relatively high. Harvest success would obviously drop later as the animals move to more secure private lands.

The other alternatives provide between 31 and 36 percent security. At any of these levels, security on National Forest lands is considered sufficient to hold elk throughout the season and provide for sustainable harvest throughout the hunting season. A relatively high migration of elk to private lands will still be expected because of the high levels of security related to the very limited hunting and lack of public access on the adjacent private lands. Alternative C would provide the greatest amount of secure area and should, therefore, provide the greatest opportunity to retain elk on public lands during hunting season.

ISSUE 2: The Effectiveness In Providing Maximum Economic Benefits.

Alternative D is expected to yield the greatest volume of commercial wood fiber (12.2 MMBF) and return the greatest revenue ($915,000) to the Counties. The alternative also provides the most favorable benefit:cost ratio (1.30).

Alternative E will provide about 10.1 MMBF of wood products, return $757,500 to the counties and have a benefit:cost ratio of 1.25.

Alternative F has an unfavorable benefit:cost ratio of 0.72. However, it represents the second largest estimated volume (11.2 MMBF). The payments to Counties estimated from implementation is $840,000.

The costs of implementing Alternative C also exceed the direct monetary return with an indicated benefit:cost ratio of 0.66. The expected revenues to Counties from the 6.3 MMBF of commercial timber is $472,500.

Alternative A is estimated to provide 9.0 MMBF of timber and return $675,000 to the Counties. The benefit:cost ratio is calculated at 1.07.

Alternative B, since it provides no outputs, would provide no revenues from the sale of commercial products.

ISSUE 3: The Effects of Activity on the Roadless and Wilderness Characteristics of the Cayuse, Camas, and Irish Gulch Roadless Areas.

Neither Alternatives B or E propose any vegetative treatments in the inventoried roadless areas. Alternative E proposes closure of about 3.5 miles of existing roads in the Camas Creek Roadless Area. Existing roadless attributes and eligibility for Wilderness designation would be retained with either alternative.

Alternative C proposes commercial timber harvest and prescribed burning in each of the roadless areas. Alternative D also proposes harvest in each of the areas but prescribed burning is limited to the Cayuse Gulch Roadless Area. Neither alternative, if implemented, would forego the consideration of any of the areas for Wilderness designation.

Alternatives A and F include timber harvest and prescribed burning in each roadless area. Each alternative would retain the wilderness eligibility for the Cayuse and Camas Roadless Areas. Neither alternative would retain contiguous blocks of 5,000 acres needed to retain Wilderness eligibility for the Irish Gulch area.

Table II-6 displays more detailed information of the proposed activities and acres affected within the three roadless areas.

ISSUE 4: The Effects of Building New Roads Within the Implementation Area.

All action alternatives except Alternative F propose construction of temporary roads and all propose some reconstruction of existing roads. The closure of all new roads to motorized use is common to all of the alternatives. Obliteration of the road prism and restoring the disturbed area to original contour is the predominate method of closure.

Each of the action alternatives also propose some closures of existing roads.

Table II-6 displays a tabular summary of the estimated miles of roads constructed, reconstructed, and closed.

ISSUE 5: The Effectiveness of the Proposed Vegetative Treatments in Responding to Forest Health Problems and sustainability of Ecosystems.

Although the alternatives differ substantially in the methods and distribution of treatments, all treatments will improve the overall health and sustainability of the treated areas. Generally, it is assumed that the more area that is treated, the greater the movement towards desired vegetative conditions.

Alternatives A, E and F treat approximately the same number of forested acres; 3,386, 3,324 and 3,492, respectively. However, they differ substantially in the number of grassland acres treated. Alternative A burns 2,913 acres of grasslands. Alternative F burns 2,464 acres and E burns 815 acres, the lowest of any action alternative.

Alternative D treats 3,004 acres of forested vegetation and 1,402 acres of grasslands.

Alternative C proposes treatment of the fewest forested acres, 2,849, but treats 2,507 acres of grasslands.

All action alternatives propose some treatments in old growth stands. Treatments on the warm/dry sites in ELU 4 will not decrease the effectiveness of the old growth but will enhance the sustainability of the stands. The amount of old growth enhanced varies from 40+ acres in Alternatives C and D to 108 acres in Alternative F.

Alternatives A, D, E and F also harvest existing old growth on the cool/moist habitats of ELU 4. Old growth characteristics will be immediately lost on these acres. The amount of treatment varies from 70 acres in Alternative D to 106 acres in Alternative E.

Alternative B, of course, does not involve any treatments.

ISSUE 6: The Effects of Applying Ecosystem Management Principles Versus Traditional Forest Service Management Principles to the Implementation Area.

An alternative designed to treat vegetation with traditional features such as 10 year treatment intervals, concentrated treatment areas and smaller treatment units was not developed.

The IDT recognized that such an alternative had some benefit in comparing the effects of such an alternative against the nontraditional approaches featuring ecosystem management principles. However, the team concluded that an alternative of this nature was inconsistent with the National emphasis and direction for ecosystem management and also inconsistent with the finding from the Big Belt Landscape Analysis. Consequently, the benefits of developing the alternative just for comparative purposes did not seem to offset the costs of developing an alternative that would be inconsistent with current Agency direction.

ISSUE 7: The Effects of Using Burning Practices as the Only Vegetative Treatment Within the Implementation Area.

An alternative was not developed that limited vegetative treatments to burning. While natural or prescribed fire might provide movement towards the desired vegetative conditions for most of the forested areas needing treatment, the costs of burning stands that could be economically harvested and provide usable forest products was not considered prudent. Deferring treatments of those stands and limiting treatment to the forested and grassland sites where burning seemed appropriate would not contribute to enhancement of vegetative health and ecosystem sustainability of the forested stands needing silvicultural treatments.

TABLE II-6 COMPARISON OF ISSUES BY ALTERNATIVE

	ALTERNATIVES					
COMPARISON ELEMENT	A	B	C	D	E	F
ISSUE I - Elk Vulnerability						
Miles open road	79	81	49	69	60	60
ORD (Mi/Mi²)	.96	.98	.59	.83	.72	.72
HC maintained (%)	34	36	35	34	34·	35
Security Area (%)	31	31	36	27	33	31
ISSUE II - Economics						
Acres harvested	2619	0	1911	3004	2807	3208
Volume (MMBF)	9.0	0	6.3	12.2	10.1	11.2
Gross receipts ($M)	2,700	0	1,890	3,660	3,030	3,360
B/C ratio	1.07	NA	0.66	1.30	1.25	0.72
PNV (M$)	8.5	NA	-1,068.0	696.9	427.7	-1,321.5
ISSUE III - Roadless						
Cayuse Gulch 19353						
Acres harvested	222	0	473	147	0	158
Acres burned	891	0	1055	141	0	846
Acres affected	1191	520	2273	917	520	646
Acres unaffected	18162	18833	17080	18436	18833	18707
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	13.6	13.6	13.6	13.6	13.6	13.6
New roads	3.4	0	0	4.8	0	0
Existing rds. closed	0	0	.4	1.1	0	0
Irish Gulch 7,787						
Acres harvested	208	0	74	238	0	736
Acres burned	1232	0	938	590	0	664
Acres affected	2768	320	394	1258	320	7787
Acres unaffected	5019	7467	7393	6529	7467	0
Wilderness eligibility	NO	YES	YES	YES	YES	NO
Existing roads	6.2	6.2	6.2	6.2	6.2	6.2
New roads	4.2	0	0	7.9	0	0
Existing rds. closed	1.2	0	4.3	0	0	0
Camas Cr. 28,832						
Acres harvested	304	0	194	529	0	159
Acres burned	569	0	474	590	0	402
Acres affected	2639	2335	1609	3759	915	2399
Acres unaffected	26193	26497	27223	25073	27917	26433
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	16	16	16	16	16	16
New roads	1.9	0	1.2	6.7	0	0
Existing rds. closed	.64	0	5.9	0	0	0
ISSUE IV - Roads						
Miles new construction	17.3	0	9.0	25.6	14.8	0
Miles reconstruction	9.6	0	7.0	15.0	14.5	8.6
Miles new roads closed	17.3	0	9.0	25.6	14.8	0
Miles existing roads closed						
Yearlong	1.8	0	21.0	5.5	14.5	14.0
Seasonal	0	0	11.0	7.0	7.0	7.0

COMPARISON ELEMENT	A	B	C	D	E	F
ISSUE V - Forest Health						
Acres treated Total	6299	0	5376	4406	4139	5956
Clearcut	423	0	150	457	52	209
Seed tree	102	0	198	1097	686	1208
Shelterwood	821	0	1027	407	746	371
Commercial thin	0	0	177	252	385	0
Selection	899	0	359	711	998	1438
Forested burn	1141	0	958	80	457	266
Grasslands burned	2913	0	2507	1402	815	2464
Acres dead forests regenerated	0		566	272	329	181
Acres insect and diseased forest treated	1970	0	1192	1752	1767	2093
Acres Old Growth removed						
Existing	96	0	0	70	106	118
Potential	0	0	0	0	0	0
Acres Old Growth remaining						
Existing	1364	1460	1460	1390	1354	1342
Potential	794	794	794	794	794	794

CHAPTER III– AFFECTED ENVIRONMENT

CHAPTER III - AFFECTED ENVIRONMENT

CHAPTER III - AFFECTED ENVIRONMENT

CHANGES BETWEEN THE DRAFT AND FINAL

Several changes have been made. These changes are primarily additions or rewording to provide more information or better portray the attributes of the existing environment. Following is a summary of the changes.

-A map showing Forest Plan Management Areas has been added.

-A map has been added to display existing elk security areas.

-Maps displaying watersheds and fisheries distribution have not been included in the FEIS. Inclusion of the maps really would not contribute to reviewers understanding of the existing condition.

-Additional information has been included in the Fisheries section to address new information obtained from recent population evaluations.

-The Wildlife section includes new information reflecting the status of the grey wolf as part of the Yellowstone experimental population. Other additions have been made in this section to clarify the situations regarding management indicator species.

INTRODUCTION

This chapter describes the existing condition of the environmental components that would be affected by the Proposed Action described in Chapter I. The discussion summarizes Forest Plan management direction for the lands within the Implementation Area and describes the existing condition of physical, biological, social, and economic components of the environment that may be affected by implementation of the proposed action and any of the alternatives.

The Implementation Area totals 36,660 acres. About 26,000 acres is on National Forest lands administered by the Helena National Forest. The activities proposed for the Wagner/Atlanta Vegetative Treatment involve only lands administered by the Helena National Forest.

I. FOREST PLAN DIRECTION

The general management direction for the Helena National Forest is found in the Forest Plan completed in 1986. The Forest Plan guides all resource management activities and establishes management standards for the lands administered by the Helena National Forest Supervisor. This FEIS is tiered to the Forest Plan FEIS.

Forest-wide goals, objectives, and standards are found in Chapter II of the Forest Plan (pp. II-1 to II-36). Forest-wide goals most applicable to this proposal include: 1) to maintain and improve the habitat over time to support big game and other wildlife species; 2) to provide a range of quality recreation, including motorized and nonmotorized opportunities, in an undeveloped forest environment; 3) to provide Forest visitors with visually appealing scenery; 4) to develop and implement a road management program with road use and travel restrictions that are responsive to resource protection needs and public concerns; and 5) to manage the Forest in a manner that is sensitive to economic efficiency.

In addition to establishing Forest-wide goals, the Helena Forest Plan provides goals for each of it's 25 Management Areas (MAs). These MAs are described in Chapter III of the Forest Plan. Proposed activities occur in the following Management Areas; M-1, L-1, L-2, T-1, T-2, T-3, T-5, W-1, and W-2.

Table III-1 displays management areas by percent of the Implementation Area and acres.

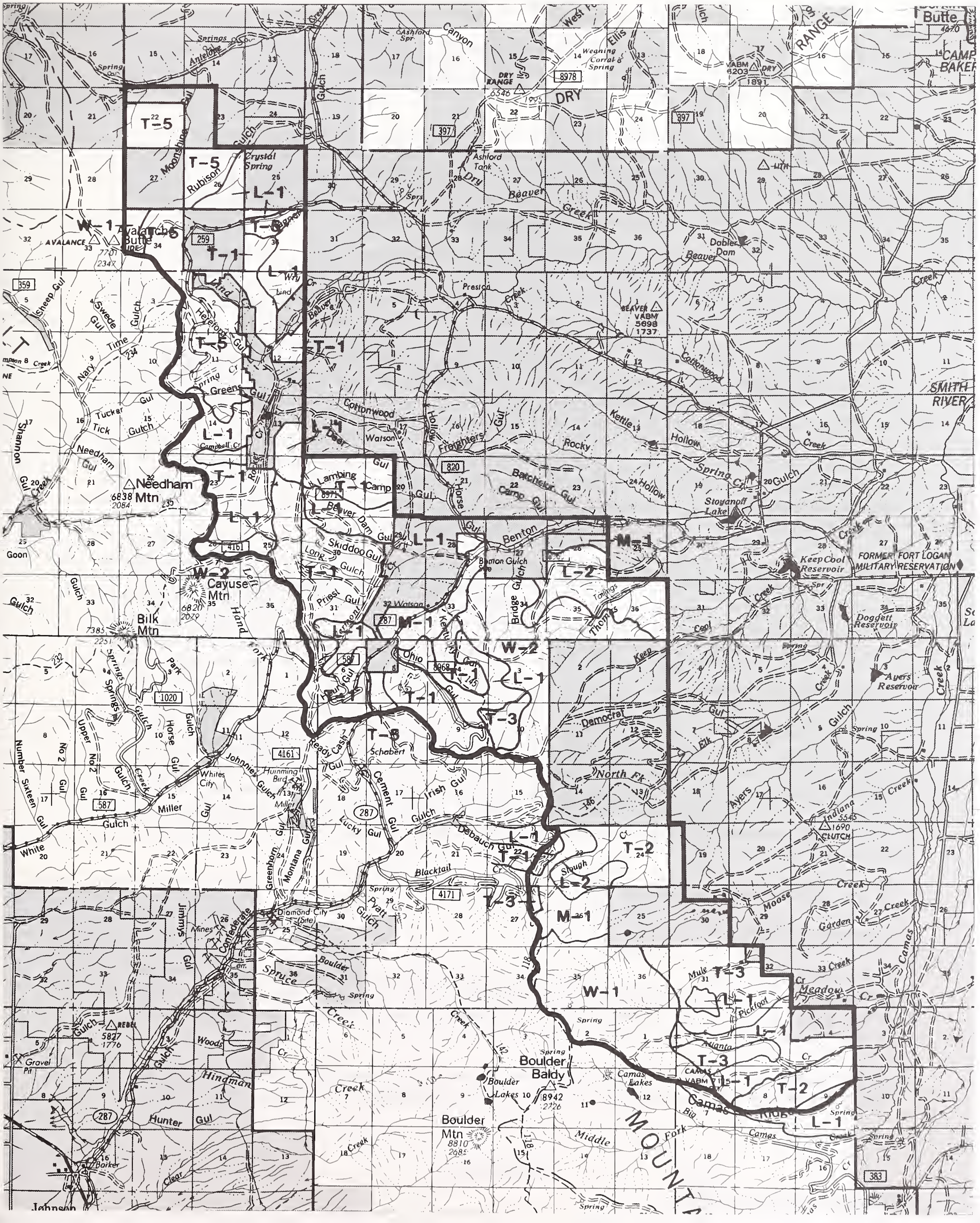
Table III-1 MANAGEMENT AREAS

FOREST PLAN EMPHASIS	PERCENT OF AREA	ACRES
Timber Emphasis (T-1)	16	4128
Timber/Big Game Winter Range (T-2)	6	1528
Timber/Big Game Summer Range (T-3)	9	2303
Timber/Range (T-5)	10	2546
Wildlife (W-1)	20	5210
Wildlife/Range (W-2)	9	2212
Minimum Development (M-1)	6	1540
Range (L-1)	20	5382
Winter Range/Range (L-2)	4	1172
TOTAL	100%	26021

Map III-1 displays the Management Areas throughout the Implementation Area.

The Forest Plan includes an analysis of inventoried roadless lands on the Helena National Forest which is documented in Appendix C of the Forest Plan EIS. As a result of this analysis some roadless areas were recommended for inclusion in the National Wilderness Preservation System and others were assigned various nonwilderness prescriptions. Portions of the Camas Creek Roadless Area are currently proposed for wilderness status in a bill that has passed the U.S. House of Representatives. The Cayuse and Irish Gulch Roadless Areas were not proposed for wilderness designation in the bill. This analysis will examine the issue of whether to develop the inventoried roadless areas, in addition to considering alternatives for how to develop them. Roadless areas are further discussed in the "Social Environment" section of this chapter.

MAP III-1 MANAGEMENT AREAS



II. DESCRIPTION OF THE AFFECTED ENVIRONMENT

PHYSICAL ENVIRONMENT

To describe the area's physical characteristics and accurately portray their function, one must begin by considering the area's position in context of the overall landscape and natural processes that have occurred. While the Big Belts are somewhat typical of mountain ranges surrounded by valleys on the east side of the Continental Divide, the inherent diversity in geologic formation, climate, soils, and topography in these areas supports a wide variety of flora and fauna.

A. LOCATION

The Implementation Area is located within the Big Belt Mountains. It encompasses approximately 26,000 acres of National Forest land between the Rubison and Atlanta Creek drainages on the east side of the Big Belt Mountains of the Townsend Ranger District, in Meagher County. The Gates of the Mountains Wilderness lies approximately 14 miles north of the Implementation Area. County road 360 accesses the Implementation Area from the east and State Highway 12 runs south of the Implementation Area. The Wagner/Atlanta Implementation Area is approximately 20 air miles northeast of Townsend, Montana, and 28 air miles east of Helena, Montana.

Elevation of the Implementation Area varies from 5,000 feet where Thompson Gulch borders the area to approximately 8,942 feet at Boulder Baldy Mountain. Topography varies from gently rolling mountains at the lower elevations in Wagner and Benton Gulches to slopes exceeding 60 percent at the higher elevations. The majority of the slopes are between 20 and 50 percent.

Annual precipitation of the area generally ranges from 15 inches at lower elevations to more than 30 inches in the Boulder Baldy area. Most precipitation occurs as snow, with deep snowpack accumulating throughout the Implementation Area. The prevailing winds are from the west and are strongest during the summer. Summers are warm in the Helena Valley and much cooler in the surrounding mountains. High intensity thunderstorms of short duration are common during the summer months.

B. NATURAL PROCESSES

Natural processes have influenced the range of natural (historic) variation of the Big Belt Mountains. They are described in the Big Belts Landscape Analysis. Processes are categorized as either watershed or vegetation processes. Watershed processes include erosion and deposition, evapotranspiration, fire, soil development, flooding and earthquakes. Vegetation processes include herbivory, fire, insects and disease, and climate extremes. Due to the influence these processes have on the Implementation Area's range of natural variation, a detailed discussion of them is located in the Project File.

C. GEOLOGY, SOILS AND WATERSHED

1. INTRODUCTION

Soil and watershed characteristics are addressed by Ecological Landscape Units (ELUs) and are characterized by Landtype Associations (LTAs) and riparian aggregates. This section describes soils and watersheds which would be affected by the Proposed Action and the alternatives being considered within the Implementation Area.

Ecological Landscape Units (ELUs) were defined by the Big Belts Landscape Analysis based on inherent landscape features which relate to broad scale processes and functions such as hydrologic,

fire, disease and insect, and nutrient cycling regimes. ELUs were geographically located based on topographic features and local climatic relationships evident from the range of plant communities the area supports. Map III-2 displays ELUs within the Implementation Area. The ELUs are comprised of landtype associations (LTAs).

Landtype Associations are groupings of landtypes (soil survey map units) that reflect repeatable patterns of soil complexes and plant communities (National Hierarchial Framework of Ecological Units, ECOMAP, USDA Forest Service, 1993). The landtypes are described in detail in the Soil Survey of the Helena National Forest Area (draft, 1988).

Riparian aggregates are a grouping of landtypes based on geology and landforms. They provide a stratification of valley bottoms based upon groupings of landtypes with similar landforms as dictated by bedrock geology and geomorphic features. Valley bottom and stream characteristics, as well as their response to management, can be predicted based on these landtypes.

Ecological Landscape Units 4 and 2 occur within the Wagner-Atlanta Implementation Area. ELU 4 is mostly mountain slopes and ridges dominated by shales and limestones. It manifests very contrasting plant communities in short distances, various aspects and degrees of exposure to weather extremes as well as some extreme variations in soil characteristics. ELU 2 occurs in the southern portion of the Implementation Area and it is relatively cold and moist. It is primarily influenced by past glaciation in the Boulder Baldy area. The nonglaciated lower portions (within ELU 4) of the watersheds in the Boulder Baldy area are affected by enhanced cold air drainage and deposits of glacial till and outwash in valley bottoms.

These ELUs also correlate to general nutrient cycling regimes. These regimes or processes are defined by the relative roles of biological agents and fire as decomposers of excess organic debris which can build up in western coniferous forests and grasslands. Such excess organic matter contains nitrogen and other nutrients in forms unavailable to higher plants. The decomposition process provides carbon which fuels the below ground system of microbes which make such nutrients available to higher plants, including conifers. Mychorrizae are strongly associated with soil organic layers and directly affect site productivity and resilience. These fungi infect and modify root tips such that the higher plant forms are better able to access nutrients and moisture. Levels of total soil organic matter (for the formation of ectomychorrizae), as well as the amount of coarse woody debris, are highly dependent on the climate and fire cycles generally defined by the ELUs. Optimal levels for the form of mychorrizae depend upon maintaining natural fire cycles.

MAP III-2 ECOLOGICAL LANDSCAPE UNITS

2. GEOLOGY

Landforms are derived from the type and configuration of subsurface bedrock. There are six predominant bedrock formations within the Implementation Area. These are from oldest to youngest;

- **Precambrian Newland formation:** A thin-bedded, fine-grained sedimentary unit. It forms ridges and ledges.
- **Precambrian Greyson formation:** A thin-bedded shale unit. It forms rolling hills.
- **Undifferentiated Cambrian formations:** This includes sections of thin-bedded limestones separated by sections of shale. The limestone units are commonly exposed.
- **Paleozoic Madison formation:** A thick sequence of resistant limestone that forms cliffs, buttresses and ridgetops.
- **Igneous intrusives:** These consist of dikes and sills intruded into the Newland formation, (often visible in roadcuts).
- **Glacial Deposits:** These consist of boulders to sand size material. The deposits mantle the drainage bottoms and adjacent benches. The boulders are composed primarily of the granitic rock types found at headwaters outside of the Implementation Area.

The sedimentary rock formations trend in a northwest to southeast direction and dip generally to the southwest. This is a result of overthrust type faulting. The orientation of the bedrock, as well as its composition influence the watershed characteristics of the drainages.

3. ECOLOGICAL LANDSCAPE UNIT 4

This ELU consists of two distinct geologic areas within the Implementation Area. Limestones mostly related to the Madison Formation occur in the extreme northern portion. Thinly bedded shales of the Newland and Greyson Formations dominate the remainder of ELU 4.

Biological decomposition within ELU 4 is limited by lack of moisture during the growing season, particularly on the south and west aspects and the grasslands. A majority of the total soil organic matter is contained in the mineral soil. Frequent, low intensity fire plays a greater role in decomposition than microbes and other biological agents. In these drier habitat types the volume of soil organic matter needed for the optimal formation of ectomychorrizae is less. Larger amounts of organic matter often present due to fire exclusion are less effective as sites for ectomychorrizae as they tend to be dry much of the year (Graham and others, 1/30/94 draft, soon to be published). Graham and others recommend at least 5 to 12 tons per acre of fresh coarse woody debris (CWD) be retained following treatments to maintain forest productivity. These CWD recommendations are for large (greater than 3 inch) diameter wood which contribute to build-up of the forest floor and soil wood before it totally decays or is consumed by repeated fires. Douglas-fir is the preferred CWD material due to its longevity. Stumps are not included in these recommendations.

The northerly aspects are intermediate between ELU 2 and the south aspects in ELU 4 in terms of nutrient cycling processes. These aspects usually experience less frequent, high intensity fires, resulting in mortality of the mature trees. On these aspects organic matter on the forest floor will retain additional moisture and provide effective ectomychorrizal habitat. The optimal level of soil organic matter is higher on these cooler moister slopes. At least 12 to 25 tons per acre of coarse woody debris should be retained following treatment to maintain forest productivity (Graham and others, 1/30/94 draft, soon to be published). Douglas-fir, where available, is the preferred CWD material due to its

longevity. Lodgepole pine is intermediate in preference. Subalpine fir decays rapidly and is less effective.

The grasslands are typified by Mollisols (soils with thick dark colored surface layers with high organic matter content). The dominant process in the development of such soils is the accumulation in the topsoil of organic matter derived from the decomposition of the leaves and roots of grasses. The organic matter is intimately mixed with the mineral material by its repeated ingestion and excretion by soil fauna (The Soil Landscapes of British Columbia, Valentine et. al., British Columbia Ministry of the Environment, 1978). The stores of nutrients in soil organic matter in grassland ecosystems are unavailable to plants except through mineralization by fire or by the slower oxidation of decay (Soil Genesis and Classification, Buol et. al., 1980). Decay of organic matter is limited by the low effective precipitation (net result of amount and timing of precipitation, soil water retention capabilities and evapotranspiration) associated with these grasslands and drier forests.

a. Limestone portion of ELU 4

- LTA's: 1 and 22
- Riparian Aggregates: 1, 12 and 13

The limestone portion of ELU 4 is found in the extreme northern part of the Implementation Area. This includes the north side of Wagner, Rubison and Moonshine Gulches. Steep-sided slopes and long, linear, gradually sloping ridgetops are characteristic. The soils are usually less than 40 inches deep to bedrock. They have high rock contents which increase with depth, and are very limey throughout or at shallow depths. This portion of the ELU primarily supports drier Douglas-fir and/or limber pine forests with bunchgrass understories and scattered grasslands. The forested soils reflect historic grass understory influence evident by dark organic matter, and rich surface layers similar to the adjacent grasslands except that they are usually thinner. Forested steep north aspects have forb dominated understories and can support subalpine fir. Due to high soil pH and shallow depth to the layer of lime, lodgepole pine is nearly absent from mature forest communities even on cooler aspects.

Approximately 244 acres of past timber harvest has occurred on National Forest lands in this portion of the ELU. Most of this activity occurred prior to 1980. All units were tractor yarded and included 63 acres of seedtree harvest, 80 acres of clearcut harvest, 83 acres of individual tree selection harvest and 18 acres of shelterwood harvest. Most of the activity was associated with LTA 1 (216 acres) which is more cool and moist than LTA 22.

Streams within this portion of ELU 4 (Rubison Gulch and tributary to Antelope Creek) fall into riparian aggregates 1 (Limestone/Mountain Slopes and Ridges), 12 (Limestone/Dip Slopes), and 13 (Limestone/Structural Breaklands). The drainage pattern is dendritic with low to moderately spaced (drainage density 1.6 miles of stream per square mile) weakly incised V-shaped bottoms. This portion of the landscape is excessively drained and streams are mostly ephemeral to intermittent in nature. Stream bed substrates consist of a median (D50) particle size of fine gravel. Width/depth ratios are low to moderate and the sequence is mostly riffle with limited pools. The amount of stream that is in low similarity is less than one percent which consists of a pit that was excavated in the valley bottom to catch water.

Streams within this portion have a low to moderate susceptibility to disturbance. Of the stream reaches surveyed six percent had a low similarity and 94 percent had a moderate similarity index. The source of impairment is from past and present livestock use. This has resulted in banks with bare soil exposed (as high as 40% bare soils in some places) and moderate vegetation use. However, once damaged, their resiliency is also considered to be low to moderate. The soils have relatively low erosion and road sedimentation problems assuming adequate ground cover is maintained and runoff is not concentrated. The weighted average sediment potential index is moderately low (0.1). Sediment potential indices are based on surface soil erosion and delivery efficiency of landforms. Stream

channels have a low to moderate susceptibility to downcutting in response to increased peak flows. This includes runoff exaggerated by road drainage and vegetation removal. Due to very low flows, streams are generally limited in their energy supply and will aggrade if excessive sediment is introduced. Response to intense rainstorms can be rapid due to shallow soils, moderate drainage density and the somewhat hydrophobic (water repellant) nature of the limey soils when dry.

Mechanical soil displacement is a concern despite the better developed dark surface layers, due to high soil lime and rock contents which increase radically with depth. These medium textured soils are susceptible to detrimental soil compaction when moist due to repeated passes by heavy equipment or as a result of ungulate concentrations.

b. Shale Portion of ELU 4:

- LTA's: 13, 2, 18 and 19
- Riparian Aggregates: 3 and 15

The greatest portion of ELU 4 (approximately 24,096 acres within the Implementation Area) is influenced by shales and similar rocks. It is the predominant formation in the Implementation Area. It occurs from Upper Beaver Creek to Atlanta Creek. Outcrops are not common, but where found are usually scree slopes of broken, platey fragments.

LTA 13, south of Moose Creek, is dominated by cooler, moister subalpine fir habitat types. Landforms are mainly nonglaciated mountain slopes and ridges, however, moderately sloping structural benches occur. The forested areas are Douglas-fir dominated communities on southerly aspects which support understories strongly influenced by bunchgrasses (especially under historical fire regimes). The north aspects support Douglas-fir, lodgepole pine and in some cases subalpine fir and have shrub and grass (pinegrass) dominated understories. The forested soils are weakly developed on south and west facing slopes but have modest subsoil clay development on cooler, moister aspects. They are 20 to more than 60 inches deep to bedrock and have either thin or poorly defined dark surface layers. They are without subsurface lime except on some south facing slopes.

The grassland soils (primarily LTA 2) have thick dark surface layers and are usually 20 to 40 inches deep to bedrock. Soils on the highest elevation ridges (LTA 18) and the steeper grasslands are mostly less than 20 inches deep to bedrock.

Approximately 1,200 acres of past timber harvest has occurred on Forest Service lands in this portion of the ELU. Most of this activity (approximately 70 percent) happened prior to 1980. Tractor yarded units include 523 acres of clearcut harvest, 118 acres of seedtree harvest, 106 acres of salvage logging, 39 acres of individual tree selection harvest, 25 acres of shelterwood harvest and 21 acres of commercial thinning. Cable yarded units include 333 acres of clearcut harvest, 24 acres of seedtree harvest and 5 acres of shelterwood harvest. Most of the earlier cable units were yarded with short span jammer systems which required numerous closely spaced roads oriented perpendicular to the slope. Most harvest activity was associated with LTA 13 and forested inclusions within LTA 2.

Streams within this portion of ELU 4 (Beaver Creek, Vermont Creek, Beaver Dam Gulch, Benton Gulch, Bridge Gulch, Thomas Creek and lower portions of Slough, Mule, Pickfoot and Atlanta Creeks) fall primarily into riparian aggregate 3 (Metasedimentary Rock and Mountain Slopes and Ridges). South of Moose Creek, however, streams run through riparian aggregate 15 (Metasedimentary Rock/Structural Benches). Some glacial influence occurs in the southern portion of this ELU. The drainage pattern is dendritic with moderately spaced (drainage density 1.7), deeply incised V-shaped bottoms. This is a well drained landscape with mostly intermittent first and second order streams. Perennial flows are more common in third order streams. Such flows also occur where this ELU adjoins the Boulder Baldy area due to the influence of glaciation at higher elevations and the localized till and outwash deposits extending into the bottoms in ELU 4.

Stream bed substrates consist of a median (D50) particle size of fine gravel and a dominate particle size (D84) of coarse gravel. Cobble size material tends to be channery in the shales. Particle sizes are larger (D50, very coarse gravel, D84, large cobble) where there is glacial influence. Width/depth ratios are low (8-12) and the sequence is generally riffles with limited pools. Streams are considered confined.

Streams in this portion of ELU 4 have a moderate to high susceptibility to disturbance (especially from grazing) and have a moderate resiliency index. Soils have a relatively low susceptibility to surface erosion and road sedimentation problems assuming adequate ground cover is maintained and runoff is not excessively concentrated. The weighted average sediment potential index is moderately low (0.07). Because streams are confined and have a small substrate particle size, channels are subject to downcutting from increased peak flows. This includes peak flows exaggerated by concentrated road drainage and excessive vegetation removal. Where streams are influenced by glacial deposits such as in the Boulder Baldy area they become much less sensitive to peak flow increases and are unlikely to experience downcutting.

The forested soils have thin or poorly developed topsoil layers which are highly susceptible to mechanical displacement. These medium textured soils are also susceptible to detrimental compaction by multiple heavy equipment passes and concentrated ungulate use.

Most existing Forest Service timber sale harvest units in the Implementation Area occur within the shale dominated portion of the ELU 4 and LTA 13. They are in various stages of hydrologic recovery.

ELU 4 landtype and watershed characteristics are displayed in table format, located in the Project File. Table III-2 provides a summary of this information.

TABLE III-2
RIPARIAN DISTURBANCE SURVEY RESULTS - ELU 4

STREAM	SIMILARITY LEVEL	SOURCES OF IMPAIRMENT	RESULTING CONDITIONS
Beaver Creek	7% low 93% moderate - high	mining, livestock* & big game use	raw banks with little vegetation and bank failures. Hedging of willows by moose.
Campbell Creek	13% low 51% moderate 36% high	livestock use	trampled banks with little vegetation, bare soils (52%) trailing.
Rocker Creek	51% moderate 49% high	livestock use	Exposed banks
Hereford Creek	73% moderate 27% high	livestock use	bank trampling in places w/ humomocky soils.
Bridge Gulch	8% low 53% moderate 39% high	livestock use, mining	bank trampling & failing, bare soil and channel changes.
Priest Gulch	56% moderate 44% high	livestock use	trailing adjacent and across streams. Trampling & bank erosion, bare soil (30%)
Long Gulch	overall moderate	livestock use	bank disturbance, some trailing in spots.

STREAM	SIMILARITY LEVEL	SOURCES OF IMPAIRMENT	RESULTING CONDITIONS
Vermont Creek **	first 3rd is extreme lower portion moderate	livestock use, mining	mining impacts, trampling
Beaver Dam Gulch	overall moderate	livestock use, mining	vegetation has a moderate similarity to site potential.
Lambing Camp Gulch	6% low 49% moderate 45% high	livestock and big game use	bank trampling, bare soil (62%) trailing, compaction & puddling.
Benton Gulch	31% low 40% moderate 29 % high	livestock use, placer mining	trailing & bank distribution altered stream channels and sparse vegetation, bare soil (82%)
Ohio Gulch	11% low 8% moderate 81% high	past harvest & roading, livestock use.	oversteepened bare banks blocked drainages.
Little Bridge Gulch	overall high	livestock use	trailing, bank trampling
Ready Cash Gulch	overall high	mining activity	mining impacts
Kentucky Gulch	5% low 33% moderate 62% high	livestock use	trailing, bank trampling, compacted soil, bare soils (58%).
Thomas Creek	65% low 4% moderate 31% high	mining, past harvest, roading, livestock use	severe channel alteration, weedy species, mine tailings are sparsely covered & banks consist of sparsely vegetated gravel.
Rubison Gulch	<1% low 99% high	pit excavated in valley bottom to catch water	
Wagner Gulch	6% low 94% moderate	livestock use	banks with bare soils (40%) and moderate vegetation use.

* Past and present livestock use.
** Because Vermont Creek is currently being mined, total disturbance was not assessed.

4. ECOLOGICAL LANDSCAPE UNIT 2

a. Tertiary Granitic Bedrock:

- LTA's: 7, 17, and 23
- Riparian Aggregates: 10, 11 and 24

This is the wettest and coldest ELU in the Big Belts and includes the highest elevations in the range. Unlike ELU 4, this ELU (approximately 2,923 acres within the Implementation Area) is mostly influenced by Tertiary granitic bedrock. It is locally comprised of Landtype Associations 7 (subalpine fir habitat types - alpine glaciated), 17 (subalpine fir-whitebark pine and Idaho fescue habitat types), and 23 (Douglas-fir, subalpine fir and forested scree habitat types). The soils are weakly developed, contain high subsurface rock contents and often have surface layers influenced by volcanic ash. Surface boulders occur throughout the area. LTA 7 is composed of glacial landforms such as glaciated mountain slopes and ridges, moraines, trough walls and cirques. Soils are weakly developed and often have volcanic ash influenced surface soil. On all but glacially scoured trough walls and cirques the soils are generally deeper than 40 inches to bedrock. Lower slopes and depressional areas, where glacial till deposits are thicker, have deeper soils. Subsurface rock is moderately high and is subrounded due to glacial transport. The associated nonglaciated mountain ridges (LTA 17) and slopes (LTA 23) also have weakly developed soils, 20 to 60 inches or deeper to bedrock.

No past timber harvest has occurred on National Forest lands in this ELU within the Implementation Area.

In this ELU organic matter and nutrients are concentrated in the relatively thin poorly developed surface soil layers. Where present, a thin mantle of volcanic ash often enhances productivity potential when cold climate is not severely limiting. These surface soil layers are susceptible to mechanical detrimental displacement and compaction which will reduce site productivity and resiliency.

Biological decomposition is limited by cool temperatures and the short growing seasons associated with subalpine fir habitat types. Organic matter is concentrated in the forest floor, woody residue and soil wood as opposed to the mineral soil. Most of the feeder roots and microbial activity occur in the upper 12 inches of the soil which includes both the organic and mineral layers. Woody residue has a relatively high nitrogen fixation rate. A higher percentage of total nitrogen is fixed in woody debris compared to the drier ELU 4 which is dominated by Douglas-fir habitat types. Fire is less frequent and of higher intensity due to organic matter buildup and more extreme burning conditions. Low temperatures severely limit both organic matter decomposition and tree growth at the higher elevations. On such sites organic matter on the forest floor will retain moisture and provide effective ectomychorrizal habitat. The optimal level of soil organic matter is higher on these cool moist slopes compared to drier and warmer regimes.

At least 12 to 25 tons per acre of CWD should be retained following treatment to maintain forest productivity (Graham and others, 1/30/94 draft, soon to be published). These CWD recommendations are for large (greater than three inch) diameter wood which has a high likelihood of contributing to the forest floor and soil wood before it totally decays or is consumed by repeated fires. Douglas-fir, where available, is the preferred material due to its longevity. Lodgepole pine is intermediate in preference. Subalpine fir decays rapidly and is less effective. Stumps are not included in these recommendations.

The grasslands were subject to more frequent lower intensity fires historically and much of the organic matter is concentrated in the surface soil layer (refer to discussion under ELU 4).

Streams in this ELU (upper portions of Slough, Mule, Pickfoot and Atlanta Creek) fall into riparian aggregates 10 (Granitic Rock/Mountain Slopes and Ridges), 22 (Granitic Rock/Glaciated Mountain

Slopes) and 24 (Granitic Glacial Till and Moraines). The drainage pattern ranges from largely undissected in the granitic mountain slopes and ridges to more of a dendrite pattern in the granitic glacial till and moraines. Likewise, drainage densities range from 0.97 to 3.80 respectively. High snowfall amounts combined with the capacity of the glacial deposits to retain and slowly release water results in a high number of perennial streams within this ELU. Stream substrate particle size distribution tends to be bi-modal in the unglaciated granitics with a large amount of coarse sand sized particles and a dominate particle size (D84) of medium boulders. Glacial influenced streams have a median particle size (D50) of very coarse gravel and a dominant particle size (D84) of large cobble. Width/depth ratios are low and there is often a step pool sequence in steeper gradient reaches. Pools are common with boulders and large woody debris playing a significant role.

Streams have a low susceptibility to disturbance as well as a low resiliency. Soils have a moderate susceptibility to surface erosion and road sedimentation, especially if adequate ground cover is not maintained or runoff is concentrated. The sediment potential indexes range from moderately low to moderate (.09 to .17). Stream channels are resistant to erosion from peak flow increases due to plentiful cobble and boulder content.

Landtype association and watershed characteristics for ELU 2 are displayed in table format located in the Project File. Table III-3 summaries the information below.

TABLE III-3
RIPARIAN DISTURBANCE SURVEY RESULTS - ELU 2

STREAM	SIMILARITY LEVEL	SOURCES OF IMPAIRMENT	RESULTING CONDITIONS
Slough Creek	high	mining, past harvest & roading	low disturbance noted.
Upper Moose Creek	high		little to no disturbance
Mule Creek	high		little to no disturbance
Pickfoot Creek	14% low 3% moderate	livestock use	bank trampling, trailing bare soil (64%), bank sloughing, channel alternations
Atlanta Creek	high	mining	channel alterations

* Past and present livestock use.

D. WATER QUALITY

1. Analysis and Data Collection

The Wagner/Atlanta Implementation Area includes 15 major drainages. The Project File contains a list of the individual watersheds, acres by landtype and riparian aggregate within the watershed, and miles of perennial and intermittent stream by landtype. This is visually displayed in the Watershed/Stream Map III-2.

A variety of data has been collected in the Implementation Area. Riparian disturbance surveys were conducted during the summer of 1993 by District personnel. Surveys included vegetation, channel, and bank disturbance studies which were accompanied by photographs and written descriptions of

disturbance. These surveys and other data collection methods including a water quality monitoring station and snow survey sites are further detailed in the project file. This information provides an understanding of site characteristics of streams on the Forest and enables predictions to be made of channel responses due to possible disturbances.

Stream channel morphology is the basic integrator of hillslope and stream channel responses to land management activities. Because of this, stream channel morphology will be the primary indicator of cumulative water resource effects. Effects will be quantitatively addressed through changes in similarity indices. Similarity levels refer to how similar a particular stream reach is to inherent site characteristics. To aid in this evaluation of cumulative watershed effects, the R-1 WATSED Model was run on important fisheries streams (Elk and Slough). Watershed processes and rationale for effects analysis is further detailed in the Project File.

2. Water Uses and Condition

Past and present management activities affecting the water resource are discussed in the Project File. The average natural sediment rate, sediment potential index, and results of the riparian disturbance surveys are listed for each of the drainages. The riparian disturbance survey describes the source and extent (% of stream and disturbance level) of impairment and a description of what that impairment entails. Individual riparian disturbance forms and photographs are on file with the forest hydrologist.

All of the waters in the Implementation Area are classified B-1 by the State of Montana (Administrative Rules of Montana 16.20.607). Waters classified B-1 are suitable for drinking, culinary and food processing purposes after conventional treatment; bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply. State water quality regulations prohibit any increase in sediment above "naturally occurring" concentrations in waters classified B-1. "Naturally occurring" means conditions or material present from runoff or percolation over which man has no control *or* from developed land where all reasonable land, soil and water conservation practices have been applied. "Reasonable land, soil, and water conservation practices" are those practices which protect the beneficial uses listed above. Water quality standards specific to Class B-1 waters appear in section 16.20.618 of the Administrative Rules of Montana.

Water from the Implementation Area is used by livestock, wildlife, and for irrigation (below the forest boundary). Non-consumptive uses include mining (see section on mineral activity) and fisheries (see fisheries section). One ditch that has a potential for being affected is located on upper Atlanta Creek and transfers water to Pickfoot Creek for use in a livestock pond located at the forest boundary.

E. AIR QUALITY

The Implementation Area is classified as a Class II Air Quality Management Area. The Scapegoat Wilderness and the Gates of the Mountains Wilderness are the only Class I areas on the Helena National Forest. The Gates of the Mountains Wilderness Area is the closest Class I airshed to the Implementation Area. The Implementation Area is located within Montana Airshed 8b.

Air quality throughout the Implementation Area is excellent. Data was collected for a project approximately 30 miles to the southwest and is the best recorded data available. The maximum recorded 24 hour particulate matter (PM) level was well below (17 percent of permitted) the Federal and Montana standard. The annual baseline is also well below the Federal and Montana standard (Baseline Air Quality and Meteorological Data Summary of the Diamond Hill Project, September 1989 - October 1990).

On-Forest sources of air pollution are road dust, engine exhaust, natural fuel burning, slash burning, and wildfires. Off-Forest sources of pollution include smoke from slash burning, and wildfires in Western Montana, Idaho and Washington, local industries, engine exhaust, and heating systems.

Wind dispersion is excellent most of the year: The prevailing winds are from the west, with an average speed of 7.7 miles per hour. Winter inversions cause air quality problems in Helena and, to a lesser extent, in Townsend and White Sulphur Springs. For this reason prescribed burning does not occur on the Helena National forest during the winter months (December, January, and February).

This airshed has the fewest number of planned fall prescribed burns in the state. The Montana Smoke Management Unit has not had to impose any restrictions on open burning in this airshed since 1987. Only 35 days have had burning restrictions since the inception of the smoke management program in 1979. This means that burning can be accomplished in this airshed with little chance of exceeding Federal or State standards.

BIOLOGICAL ENVIRONMENT

The landscape is composed of ecosystems which support a diversity of forest and grassland resources and uses. It is from this perspective that we begin to define and understand the area's biological and environmental components.

A. NONFOREST VEGETATION

Vegetation communities will be discussed with regards to their composition and unique characteristics, including their ability and function in providing habitat for wildlife. Although rock/scree and alpine vegetation types are important wildlife habitats, they will not be affected by the proposal and will not be discussed.

1. Grassland/Shrubland Vegetation

Grassland/shrublands occupy about 20 percent of the Implementation Area. Shrublands make up less than one percent of the area but provide for a wide variety of diverse habitat types. The south portion grasslands occur as small parklike openings within large patches of coniferous forest. They also occur in the lower elevations along ridges or on south facing slopes. The north end has grasslands that are large with homogeneous openings, where habitat type changes in relation to topographical features. Small patches of coniferous vegetation break up the landscape patterns. Except for the park openings, elevation does not seem to be a factor in grassland productivity or composition.

As vegetation species composition changes, so does food availability. Nesting and security needs also change for various wildlife species. Roads through grassland/shrubland habitats have aided in the spread of non-native vegetation and noxious weeds, as well as increasing fragmentation and road densities. The high density disturbance is generally associated directly with the road and decreases as you get away from roads.

2. Grassland Vegetation

Higher elevation park grasslands in the southern portion of the Implementation Area are fairly stable in terms of vegetative condition and size. Some small inclusions of riparian communities with tufted hairgrass and various sedges do exist. There is not any colonization by the coniferous forest into these parks. Rough fescue occupies more than 50 percent of the canopy. Idaho fescue, timber oatgrass, bluegrasses and a variety of forbs are also represented.

Grasslands in this area are generally very productive. Most of the grassland is rough fescue/Idaho fescue with inclusions of aspen, bitterbrush, and sagebrush islands. The south facing slopes are a mixture of the rough fescue/Idaho fescue and Idaho fescue/bluebunch wheatgrass habitat types. Potential productivity ranges from 600-1200 lbs/acre.

Livestock grazing has affected both productivity and species composition. About 20 percent of the grasslands are in a high or potential seral stage. Grasslands in high seral stages receive very light, if any, livestock use. Rough fescue plants are bunchy and either very productive or stagnant. Younger plants are vigorous while older plants contain a high proportion of dead material compared to photosynthetic leaf area.

The rest of the area is in a mid or low seral stage. In the rough fescue communities, canopy coverage by rough fescue is less than 5 percent. Timber oatgrass, Sandberg bluegrass, pussytoes and sandwort dominate the ground cover. Production is 200-500 lbs/acre.

The north portion of the Implementation Area is made up of large grassland areas. Seventy percent of the area consists of rough fescue/Idaho fescue habitat type. The remaining 30 percent consists of Idaho fescue/bluebunch wheatgrass or rough fescue/bluebunch wheatgrass habitat types. Potential productivity is 600-1200 lbs/acre.

Conifer colonization in the Moonshine and Thomas Gulch areas is reducing size and productivity of the grassland communities. Reduction in the size of the grassland ranges from 10-40 percent. Species composition has changed to an increased diversity of forbs and a decrease in desirable grasses. Grass production has decreased to 50-300 lbs/acre.

Livestock grazing has been less impactive in the north portion of the Implementation Area compared with the south portion. This may be due to more conservative stocking rates, effective grazing systems and good distribution of livestock. There are scattered areas where livestock has impacted the sites as described previously for the south portion but, for the most part, the grasslands are in high and potential seral stages.

There are large areas of rough fescue dominated sites that have a high component of wolfy or stagnant plants. These sites are very stable but provide little species diversity. As discussed earlier, these stagnant plants produce less photosynthetic tissue annually. This is not likely to change unless there is some disturbance to the plants.

The reduction of grass and forb species by shrub and conifer colonization has resulted in a decrease in available nesting areas in the Rubison area and foraging options for grassland species, including the Baird's sparrow and savannah sparrow.

Elk, mule deer and black bear are the predominate big game species that use the grassland habitat.

3. Noxious Weeds

Several species of noxious weeds inventoried within the Big Belt Mountains are listed in Table III-4.

TABLE III-4 NOXIOUS WEED OCCURRENCE

NOXIOUS WEED	LOCATIONS	DENSITY
Leafy spurge	Thomas Dredge	1/4 acre or less
Black Henbane	Belts Area	Few plants scattered along many roads
Spotted knapweed	Cement Gulch Blacktail and Ohio Gulch Confederate Gulch; Duck Creek, Thompson and Baldy Face.	Within grazing allotments and around mining sites. 300 acres in the drainage, especially around mines at F. S. boundary; largest infestation in Belts. Scattered plants. About 5 acres
Canada thistle	Entire Implementation Area	Plants infest areas around old clearcuts and burns Approximately 150 acres of this weed exists in scattered patches.
Common tansy	Duck Creek Sec. 36	Less than 1/4 acre
Musk thistle	Entire Implementation Area	Thistles infest riparian areas and disturbed sites. Approximately 200 acres exist in scattered patches

Surveyed areas include Thomas Gulch south to Atlanta Creek. There have been few weeds reported or located on the Keene, Snedaker, Wagner, Spring Creek, and Watson grazing allotments. From Benton Gulch south to Duck Creek, weed surveys have identified populations of weed species listed in Table III-4. Surveyed areas include roadsides, rangelands, riparian zones, timber lands, mining sites, and areas impacted by trails.

The infestations of weeds, mostly spotted knapweed, tend to be less than five acres and are in scattered patches. Some leafy spurge plants have been found along the Thomas Dredge. Both houndstongue and henbane exist along roads in cool wet areas, and thistles have invaded many of the disturbed sites in mining and logging areas, particularly in the Long Gulch area.

Due to their rapid rate of spread and difficulties to control, leafy spurge and knapweed have top priority for control. Treatment programs have consisted of biological, chemical and mechanical methods. Biological agents currently in use are: *Urophora affinis* and *U. quadrifasciata*, seedhead flies for spotted and diffuse knapweed; and *Rhinocyllus conicus*, a seedhead weevil for musk thistle. As biological control agents become available, they will be released in areas inventoried as high priorities. Chemicals applied include Tordon 22K, Tordon 2K, and 2-4D Amine.

Biological and chemical control efforts have decreased knapweed populations due to ongoing treatment and accessibility of the infestations. Musk thistle populations on the Townsend Ranger District have responded well to the *Rhinocyllus conicus* weevil. Canada thistle has been treated with *Ceutoyhyncus litura*, a root boring weevil. However, survival rates have not yet been determined for this insect.

The most troublesome source of infestation of knapweed in the Implementation Area is located close to the Forest boundary at Confederate Gulch. Though this area is two miles outside the Implementation Area, it is considered a seed source affecting the surrounding area. The weeds in the Confederate Gulch area are inaccessible physically and is not a cost effective treatment due to present and historic mining activities. In some cases the weeds cannot be reached by hoses and ground spraying equipment. The use of ATV equipment is feasible in some of the area. Much of this infestation is on rocky, shaley, steep side hills. The seedhead flies, *U. affinis* and *U. quadrifasciata*, have been released in this area and have established good populations. Continuing chemical control and further biological efforts need to be made in this area. A root boring moth for the control of spotted and diffuse knapweed, *Agapeda zoegana*, shows much promise and, if available, will be released in the area in 1995.

B. FOREST VEGETATION

The Big Belts Landscape Analysis provides thorough discussion of the Implementation Area's landscapes. Both ELU 2 and ELU 4 are represented. It should be understood that these landscapes are not discrete and that their borders blend with one another in landscape elements and processes.

1. FORESTED VEGETATION COMPOSITION

Forests within ELU 2 are generally mature. ELU 4 is composed of a mosaic of forest types. Fire has been a predominant process which has affected forested habitats in both ELUs. In addition, aspect largely determines the forest type and ecosystem processes found in ELU 4. The following species use forests for one of their major habitats; elk, mule deer, black bear, pine marten, goshawk, flickers and hairy woodpeckers.

Map III-3 displays forest composition of the Implementation Area. Based on a query of the Timber Stand Data Base (TSDB) the present forest age class structure in the Implementation Area is displayed in Table III-5.

TABLE III-5 FOREST AGE CLASSES

ELU	< 60 Years	60-99 Years	100-119 Years	120-159 Years	> 160 Years
ELU 2	2%	8%	23%	64%	3%
ELU 4	13%	3%	42%	37%	5%

Based on aerial photography interpretation the present forest composition of the Implementation Area is displayed in Table III-6.

MAP III-3 FOREST COMPOSITION

TABLE III-6 FORESTED SPECIES COMPOSITION

SPECIES COMPOSITION	ELU 2 ACRES	ELU 4 ACRES	ELU 2 %	ELU 4 %	TOTAL ACRES	PERCENT
Mature Engelmann spruce and subalpine fir	554	1341	16	6	1895	7
Mature stands of lodgepole pine	1096	3427	32	15	4523	17
Mature forests with of least 30% Douglas-fir	1102	8632	38	38	9734	37
Lodgepole pine poles	78	600	2	2	678	3
Other species of poles	97	1357	3	6	1454	6
Rock	45	77	1	1	122	<1
Tree seedlings	206	1084	6	5	1290	5
Dry meadows	40	6087	1	25	6127	24
Wet meadows	2	141	1	1	143	1

1. SUBALPINE FIR FOREST HABITAT TYPES (ELU 2)

ELU 2 represents the cold and moist forests in the Big Belt Mountains. It is dominated by subalpine fir forest habitat types, and includes alpine meadows and areas which support whitebark pine. Southern portions of the Implementation Area are dominated by subalpine habitat types. Predominant tree species include lodgepole pine, Douglas-fir, Engelmann spruce and subalpine fir. Engelmann spruce and subalpine fir are probably more abundant at present because fire control has moved this ELU towards a more advanced successional stage. Stand structure is generally single-storied and evenaged.

Whitebark pine is a component of the highest elevation forests. These krumholtz or timberline forests are affected by white pine blister rust and are experiencing heavy mortality from this fungi. These forests are in steep decline. Some trees may have a natural resistance to attacks from white pine blister rust. Genetic testing has begun to attempt to isolate and breed such individuals.

Fire is a predominant process which affects this landscape and forest habitats. When severe burning conditions are present extensive fires can result in the death of a majority of forest trees. Fires of this type are "lethal" to the existing forest. It is probable that large portions of ELU 2 were involved in fires that burned thousands of acres at a time. Some landscape features such as wet areas, rocky outcrops, successional stages, ridges, draws and the randomness of the fire's behavior allow some forest's remnants to survive. These remnants occur as individual tree remnants and stand remnants. It is these surviving remnants which develop old growth forest conditions. Given the time since the last disturbance, a parcel of land may contain a variety of forest successional stages from seedlings through old growth. Fire control has not yet significantly disrupted forest composition or structure in this ELU.

When a forest functions with lethal processes it has landscape implications for particular resources that forest can provide. Lethal forest processes tend to create forests which are all the same age as most of the trees within the forest die and then regenerate simultaneously. Snags are periodic on the landscape. Following the death of the forest they are in great abundance. Over the course of a few

decades these snags fall. There develops a point in the life of the forest type when snags are limited, generally at about age 60 to 110 years. If a lethal process does not again affect the forest, snags again begin to develop as seral species succumb to pathogens. Lethal processes, especially fire, tend to occur over large landscapes but not all stands in the landscape will be affected. This creates forests with little internal structural diversity, but with between stand structural diversity. Because the patches tend to be large the edge effects tend to be limited on the landscape.

In addition to fire, landscapes in ELU 2 are influenced by aspect with some warm dry aspects being dominated by grasslands. Forested areas are generally continuous and extensive.

Based on stand examination records most mature forest stands in the area support approximately 300 trees per acre with canopy closures often exceeding 75 percent. Fuels are variable depending on the successional stage of the stand but they are generally predictable in conjunction with the stand's development. Following a natural disturbance (such as fire or windthrow), fuels in young stands (less than 30 years) will be heavy and range up to 100 tons per acre. A subsequent burn may remove most of these heavy fuels. By the time the stands have aged to around 70 to 100 years, fuels have generally been reduced to a more moderate loading of 10 to 15 tons per acre. Eventually, as seral species die out (beginning around 90 to 120 years), fuels again increase to levels of 20 to 50 tons per acre.

Another characteristic of ELU 2 is the large expanses of coniferous cover. Within these forests, small grassland meadows, scattered stands of existing and potential old growth and rock and talus slopes occur throughout the area. Species that use the large expanses of continuous cover include pine marten, wolverine, interior bird species, red-backed vole and other small mammals.

Within the Implementation Area, these large expanses of interior forest conditions occur in limited distribution. These habitats offer seclusion from predators, forage for prey species and a variety of niches for shelter.

The cool to cold, wet old growth areas occur in the upper elevations of the Implementation Area. These habitats have multi-layered canopies, a variety of downfall, and varying age classes of snags. Within the Implementation Area this type of old growth is generally surrounded by younger evenage stands of conifers giving the old growth an interior forest condition. These old growth interior forests have multi-layered vegetation in the understory coupled with the light and climatic variables that offer a variety of niches for wildlife, some of which include insectivorous birds, small mammals, and raptors. The snags, along with dead and down material, supply food and nesting for cavity dependant birds as well as a variety of insects. The dark, more mesic environment provides for a variety of fungi and insects which in turn become food for small mammals and birds, adding to the species richness and diversity. Big game use these areas during the summer for thermal cover to reduce heat stress. During the winter these areas are important foraging and denning habitat for the pine marten and wolverine.

2. DRY DOUGLAS-FIR FOREST HABITAT TYPES (ELU 4)

The warm, dry, south and west aspects of ELU 4 are dominated by Douglas-fir and/or grasslands. Before fire control these stands were sparsely forested and were subject to frequent low intensity fires which functioned to keep fuel loading low (approximately 5-8 tons per acre). The fires killed most small trees and maintained the forest in an open grown condition of scattered old Douglas-fir. These non-lethal underburning fires functioned to maintain a forest where individual trees or groups of trees died but the forest canopy remained a relative constant on the landscape. The trees had a long lifespan and the frequency of understory trees entering the overstory was low. The forest had an old growth character. Trees were of higher density in occasional clumps on more moist and less harsh

microsites. They were also more common where topographic features such as rock outcrops would impede a fire's spread.

When a forest functions with non-lethal processes there are several implications for that landscape. Non-lethal processes tend to create forests which are not all the same age because only individual trees die and are replaced. This generates a snag resource which is constant on the landscape. It also creates structural diversity within the forest stand as all size and age classes are represented. Within the stand this diversity creates an interior edge effect due to its multi-canopied nature.

Fire suppression has disrupted the natural processes of the forest, especially on the warm, dry south and west facing aspects. Douglas-fir seedlings on these sites have survived at excessive levels in the absence of frequent fires. Ladder fuels have developed multi-storied canopies. Competition between trees has increased which leads to a decrease in forest health. There is a greater susceptibility of stands to insect and disease damage, as well as general mortality from such factors as winter damage. These multi-storied stands are at risk to fires of an intensity which would result in the removal of all or most of the forest canopy. Stands on these aspects tend to have multi-storied canopies consisting of the old remnant trees surrounded by younger, densely stocked stands. North of Lambing Gulch extensive forest mortality has occurred. In many areas, stand mortality ranges from 25 to 100 percent as a result of western spruce budworm, years of drought and winter damage (Klein. 1989). This mortality has occurred in both the warm/dry and cool/moist portions of ELU 4.

Past timber harvest and road construction in the mesic Douglas-fir and lodgepole habitats has affected wildlife by modifying or reducing old growth habitat, fragmenting habitat and decreasing habitat security for deer and elk. The net result is a loss of habitat for interior species, increase in cowbirds and a switch of wildlife species from specialists species (late successional) to generalist species (early successional).

The Implementation Area's ELU 4 provides most of the big game summer range and security cover.

3. MESIC DOUGLAS-FIR FOREST HABITAT TYPES (ELU 4)

On cool/moist north and east aspects, ELU 4 consisted of forested stands of mostly Douglas-fir occasionally intermixed with lodgepole pine. Sometimes fire visited these stands in a "mixed" fire behavior process. This periodic mortality would create a periodic snag resource such as that which occurs during lethal processes. It would favor retention of structural diversity within stands at the expense of the edge diversity created between stands. It would also create a generally two-storied stand following disturbance as a new age class would regenerate beneath survivors of a previous disturbance.

A "mixed" fire process may kill trees which are more susceptible to fire mortality which would result in a thinning of the forest stand. This process may also kill groups of trees within the forest. Given optimum burning conditions these stands burned with a lethal stand replacing intensity. Thick-barked Douglas-fir veterans sometimes survived these fires.

On north slopes fuels are variable depending on the successional stage of the stand but they are generally predictable in conjunction with the stand's development.

In general, when a stand replacing fire burned on north and east facing aspects it did not destroy every tree in the stand. Both individual tree remnants and stand remnants survived for much the same reasons as they survived in ELU 2. Total fire perimeter was more limited in this ELU because of the diversity of forest types found on these aspects.

On cooler and more moist north and east aspects, the suppression of fire has not had as great an effect on forest structure. These areas are 90 to 95 percent forested and these stands are generally evenaged and single-storied. Individual tree remnants and stand remnants have survived to produce structural diversity.

In addition to aspect, mesic Douglas-fir habitats are also influenced by landform. In ELU 4 drainages tend to be long and narrow and run east to west, consequently the landscape is dominated by north and south aspects. These conditions generate forests which are narrow and relatively long. The mosaic of vegetative types has resulted in a landscape which is naturally diverse. Most forested stands extend to the prairie ecotone.

Timber harvest in this forest habitat type has affected wildlife by reducing quality old growth habitat, fragmenting habitat, decreasing habitat security for deer and elk and, in addition, clearing areas which allows livestock grazing in previously inaccessible areas.

The majority of ELU 4 provides most of the big game summer range and security cover.

Elk, mule deer, black bear, pine marten, goshawk and hairy woodpeckers are the wildlife species that predominately use these forests for one of their major habitats. These areas are also favored breeding and brood rearing habitats for blue grouse.

4. SITE POTENTIAL

The landscape elements of the Implementation Area have been separated into different habitat type groups to describe more simply these complexes of landscape features that influence site potential, which is an indication of forest productivity. The interactions of a site with the local climate influence the vegetation a site can support. The predominant habitat types tend to reflect the relatively warm, dry climate of the Big Belt Mountain range. **Eastside Habitat Type Groups** in the Implementation Area are displayed in Table III-7.

TABLE III-7 HABITAT TYPE GROUPS

HABITAT TYPE GROUP	TOTAL ACRES	% OF AREA	HABITAT DESCRIPTION
Nonforest	6439	25	These are grassland or shrubland communities which are not classified in the **Eastside Habitat Type Groups**.
1 Warm and very dry	2539	10	These are the driest of the conifer forest types and are at the lower limits of forest growth.
2 Warm and dry	1869	7	These dry forests can support Douglas-fir and ponderosa pine.
3 Warm and moist	3802	15	These forests are a mixture of lodgepole pine and Douglas-fir.
4 Cool and moist	5429	21	These are the warmest forests capable of supporting subalpine fir.
5 Cool and wet	729	3	These wet forests often have a component of spruce.

HABITAT TYPE GROUP	TOTAL ACRES	% OF AREA	HABITAT DESCRIPTION
6 Cool and moist to dry	2797	11	These forests are cool, but have a variety of to dry moisture regimes.
7 Cool and moist to wet	172	1	These wet forests understories contain alder and menziesia.
8 Warm to cool and dry	1152	4	These drier upper elevation forests have a dry variety of temperature regimes.
9 Cold and dry to wet	1093	4	These cold forests have a variety of moisture regimes.
10 Cold and dry	45	<1	These forests are predominantly whitebark pine.

The dispersion of grassland and forest, which is most strongly influenced by aspect and precipitation, has resulted in a landscape which is naturally diverse. Additionally, the mountain range exists in a region of the state which also displays landscape diversity on a larger scale with isolated mountain ranges interspersed among broad valleys.

5. EXISTING LANDSCAPE

Forest types generally tend to evolve with ecosystem processes such as fire behavior. This is not to say that there is not overlap between the processes or that extremes in the ecosystem may allow a different process to occur. The following section provides an "on the ground" look at the Implementation Area as how it actually functions within the landscape.

North of Wagner Gulch are LTAs 1 and 22. These are the driest forest types present in the Implementation Area. Warm/dry aspects are forested with limber pine, sometimes intermixed with Douglas-fir. On cool, moist aspects are mixtures of Douglas-fir, Engelmann spruce, subalpine fir and lodgepole pine. This creates a diversity between stands on the landscape. Forests in this area are dry and are continuous with few grasslands intermixed within them. Forest cover is fairly continuous up to the prairie ecotone. Fires in the limber pine type do not spread extensively and the forests tend to function in a non-lethal method of individual tree replacement. The species present on the cool, wet aspect would indicate a more lethal stand replacing process.

Moving south, from Wagner Gulch to Green's Gulch, LTA 2 predominates with interspersions of LTA 13. These are dry Douglas-fir forests on the warm/dry aspects with occasional stands of lodgepole pine on cool/moist aspects. Douglas-fir have suffered heavy mortality from western spruce budworm in this area. Forests in this area tend to be extensive with grasslands occurring mainly within valley bottoms. This creates linear and connected grassland linkages on the landscape. The warm, dry aspects tend to function in non-lethal or mixed processes with associated implications for snags, structural diversity and edge. There is a gradient on these aspects where lethal processes begin to predominate which usually occurs at higher elevations. On cool, moist aspects lethal stand processes predominate.

From Green's Gulch south to the head of Beaver Creek are large grasslands on warm, dry aspects with mixed stands of lodgepole pine and Douglas-fir on the cool, moist slopes. This area is dominated by landtypes 12 and 2. Forest stands are 50 to 300 acres in size and separated by the interspersion of grasslands of similar sizes. Extensive forest mortality has occurred in these stands due to drought and winter damage. These forests functioned with lethal or mixed processes with those associated implications.

South of Beaver Creek and through Slough Creek landtype association 13 dominates. Forest vegetation consists of stands of lodgepole pine and Douglas-fir on the cool, moist aspects which is probably the result of mixed disturbance processes. On the warm, dry aspects are stands of Douglas-fir which have developed from non-lethal processes. Forested areas are generally 100 to 400 acres for both types of forest. Forests in this area are somewhat continuous and alternate the Forest types based on the aspect of the site. There are grasslands present on the landscape at the crest of the Big Belt Mountains and at the prairie ecotone to the east. On some of the cool, moist aspects past timber harvest has occurred. The warm, dry forests of this area are being attacked by western spruce budworm and are suffering moderate mortality.

In lower elevation forests to the east, in the vicinities between Benton Gulch and Debauch Gulch, landtypes 2 and 13 are intermixed. The climate in this area is drier which results in dry Douglas-fir forests on cool, moist aspects and mixed stands of limber pine and Douglas-fir or grasslands on warm, dry sites. Cool, moist sites functioned generally in a mixed process while warm, dry sites tended to be involved in non-lethal processes. Topography of the area is quite abrupt which results in many smaller forest and grassland types being intermixed. The forested areas are between 20 and 40 acres. Forests in this area are healthy although Douglas-fir is prone to attack by western spruce budworm.

South of Slough Creek and through the Implementation Area boundary on Camas Ridge, cooler, moister forest types prevail until ELU 4 grades into ELU 2. Predominant landtypes in this area include 2, 7 and 13. Forests are generally in the subalpine fir habitat series and consist of mixed species stands of subalpine fir, Engelmann spruce, lodgepole pine and Douglas-fir on the cool/moist aspects. Warm, dry aspects tend to be grasslands at the lower elevations although at higher elevations these sites also become forested with the tree species mentioned above. In the east, fingers of forest intermix with the prairie based on the aspect of the site. Forested areas are large, between 2000 and 4000 acres. These forests functioned with lethal processes with that associated landscape structure. These forests are generally healthy although there are pathogens in some stands.

6. INSECT AND DISEASE

There are a variety of insects and diseases within the Implementation Area which affect forest health. Some of these pathogens are currently found at populations greater than existed naturally due to fire suppression. Based on age, diameter, elevation, and latitude, the lodgepole forests are classified as being in a high risk state to this insect at present (Amman, McGregor.1985).

The Timber Stand Data Base (TSDB) was queried to determine what extent insects and diseases affect inventoried stands. Of the 19,674 forested component, 9,493 acres have been inventoried. The various pathogens which affect the inventoried area are summarized in Table III-8.

TABLE III-8 INSECT AND DISEASE ACTIVITY

PATHOGENS	ACRES AFFECTED	% INVENTORIED ACRES
Mountain Pine Beetle	13	<1
Western Spruce Budworm	5,617	59
Dwarf Mistletoe (lodgepole)	130	1
Stem Cankers and Decay	1,326	14
Weather Damage	662	7

Mountain pine beetle is at an endemic level affecting lodgepole pine. Western spruce budworm is of particular concern and is causing heavy forest mortality. Douglas-fir on south aspects provide ideal habitat for western spruce budworm (Carlson, Fellin, Schmidt. 1983). Cases of this insect are at a chronic epidemic stage and are intensifying due to continued colonization that is occurring. Root rots are also common in some of the Douglas-fir forests. These centers of infection are more common in the old growth Douglas-fir found on warm, dry aspects.

Probably the most significant pathogen present in lodgepole pine in the area is the parasitic plant Dwarf Mistletoe (Arcethobium spp.) This parasite does not kill the tree outright, but does weaken the tree making it more susceptible to mortality from other factors (Nichols, Egeland, Hawksworth, Johnson, Robbins. 1988).

As stated previously, the Krumholts forests are being affected by white pine blister rust. This fungus is causing heavy mortality to these forests. Other pathogens such as root rots and gall rusts are infrequently present in the area.

7. PAST AND PRESENT TIMBER MANAGEMENT

The timber stand data base gives a recent overview of forest management in the area. All past timber management has taken place within ELU 4. Map III-4 shows past and present timber harvest activities. Table III-9 presents this information below.

TABLE III-9 PREVIOUS TIMBER HARVEST

DECADE	# ACRES HARVESTED	HARVEST METHOD	TOTAL ACRES
1930 - 1939	0	-	-
1940 - 1949	0	-	-
1950 - 1959	9 15	Seedtree Selection	24
1960 - 1969	452 74 118	Clearcut Seedtree Selection	644

DECADE	# ACRES HARVESTED	HARVEST METHOD	TOTAL ACRES
1970 - 1979	342 72 15	Clearcut Seedtree Selection	429
1980 - 1989	142 48 50 9	Clearcut Shelterwood Seedtree Selection	249
1990 - 1993	0	-	-

Past timber harvest has caused some forest fragmentation depending on the type of forest harvested and the type of harvest used. Forests in the northern portions of the Implementation Area were naturally more open and are generally consistent with the description of forest conditions in the warm, dry portions of ELU 4. Harvest in these areas has not caused significant fragmentation.

In the area between Lambing Camp and Priest Gulch the forests on north aspects are generally quite dense and correspond to the cool, moist aspect forests of ELU 4. Timber harvest occurred on some of these aspects in the early 1980's. The unit sizes were generally small (less than 40 acres). While this size opening is within the desired condition for this forest type, the frequency and distribution of these openings does not meet desired conditions for the landscapes and has caused forest fragmentation.

Presently, the Wagner Salvage Sale EA proposes to salvage 156 acres of mostly dead timber within the Implementation Area. Harvest will be accomplished with a salvage cut harvest system.

8. REFORESTATION

In accordance with the National Forest Management Act (NFMA) of 1976, timber harvest and regeneration practices shall be designed to assure lands are satisfactorily restocked within five years after final harvest. In order for a harvest area to be satisfactorily stocked, it must meet the specifics as defined in the Forest Service Reforestation Handbook (FSH 2409.26b, Section 221). Restocking is satisfactory when the harvest area contains the minimum number, distribution, and species composition of regeneration which is specified in a site specific silvicultural prescription written or reviewed by a certified silviculturist.

Regeneration survey records (last updated January 1994), found in the Timber Stand Management Reporting System (TSMRS) for the Townsend Ranger District of the Helena National Forest have been analyzed, using Runstream #10. The results are shown below in Table III-10.

III-4 PAST & PRESENT TIMBER HARVEST ACTIVITIES

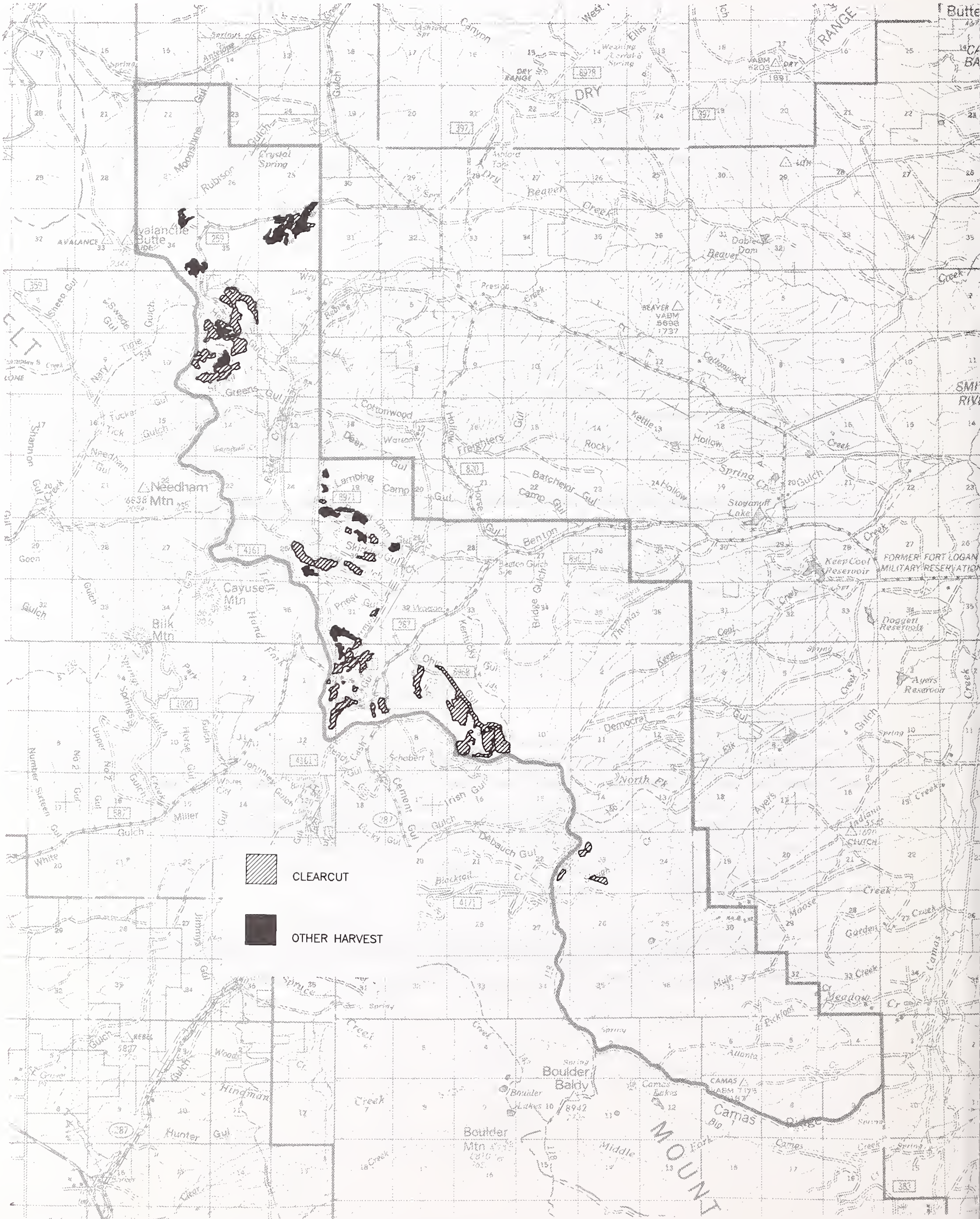


TABLE III-10 REGENERATION SURVEY SUMMARY

	TOWNSEND DISTRICT		IMPLEMENTATION AREA	
HABITAT TYPE GROUP	# OF STANDS SAMPLED	% STANDS STOCKED IN 5 YEARS	# OF STANDS SAMPLED	% STANDS STOCKED IN 5 YEARS
1 Warm and Very Dry	1	0	0	no activity
2 Warm and Dry	24	96	6	100
3 Warm and Moist	28	86	4	75
4 Cool and Moist 140.02, 019 140.02, 020	50	82	17	88
5 Cool and Wet	5	100	0	no activity
6 Cool and Moist to Dry 156.3.12	40	80	1	0 *
7 Cool and Moist to Wet	3	66	0	no activity
8 Warm to Cool and Dry	5	100	0	no activity
9 Cold and Dry to Wet	0	no activity	0	no activity
10 Cold and Dry	0	no activity	0	no activity

* limited sample

As revealed in the above table there has been limited harvest and regeneration activity within some habitat type groups in the Implementation Area. The sample was expanded to the entire Townsend Ranger District but some habitat type groups still have a small sample size.

Stands which were not classified as regenerated were analyzed as to the cause of the regeneration failure. In some stands reforestation monitoring in the late 1970's was not accomplished within the first five years after harvest. The query which was run would show this lack of monitoring to be a reforestation failure.

A timber sale in the Long/Lambing Gulch area lasted for an extended period of time due to poor market conditions and constraints of contract time. This led to lengthened time periods between harvest, slash disposal, and reforestation treatments. This caused the delay in reforestation accomplishment. Presently all harvested stands in the Implementation Area are classified as reforested.

C. UNIQUE COMMUNITIES

Unique communities were described and defined in the Big Belts' landscape document. These communities are considered unique due to the limited distribution within the Big Belts' mountain range. Because of their importance to wildlife and contributions to maintaining vegetative diversity, these communities warrant special attention. These communities that occur within the Implementation Area are described below.

1. UPLAND COMMUNITIES

a. Old Growth

An old growth forest is a plant community at an advanced stage of plant succession which has developed diverse stand structure, species composition and ecosystem functions. Old growth in the Implementation Area has been identified utilizing The Timber Stand Data Base to query for stand conditions as described in "Old Growth Forest Types of the Northern Region." These stands were then field verified to insure they contained old growth conditions.

Old growth was analyzed in two ways. It was analyzed based on the desired condition identified in the Big Belts Landscape Analysis for the various forest types of the area. This method of analysis allows a consideration of not only the amount of old growth present, but also of the structure of that old growth and whether it meets the desired condition. The desired condition for old growth identified in the Landscape Analysis is as follows:

- 5-15% of ELU 2 is old growth
- 50-75% of the warm/dry sites of ELU 4 are old growth
- 5-10% of the cool/wet sites of ELU 4 are old growth

Old growth was also analyzed according to Forest Plan standards which state that five percent of each third order drainage should be managed for old growth forests.

Only National Forest lands were identified in this analysis. Map III-5 displays the distribution of existing and potential old growth within the Implementation Area. Landscape analysis of the old growth resource is as follows.

Warm dry sites (forest habitat type groups 1 and 2)- Forests resemble those conditions described for the warm, dry sites of ELU 4. These were Douglas-fir forests exposed to frequent non-lethal underburning. Large diameter, widely spaced Douglas-fir provided low elevation old growth conditions. To fulfill the role this type of old growth provided, stands should be restored to a widely spaced savannah of larger and older trees. This is the niche which this forest type is capable of providing in order to be effective for associated dependent species. These stands have been disrupted by fire control and now display ladder fuels and significant increases in tree numbers. Under this scenario fire behavior is now infrequent, but of high intensity. This forest type is present in 17 percent of the Implementation Area. Within these habitat types, 10.2 percent is classified as old growth. The average stand size of this old growth is 25 acres.

Due to the loss of natural fragmentation and edge habitat, wildlife species in this old growth habitat now favor canopy dwelling birds as well as small mammals and large herbivores. Many of these old growth areas are important winter range for big game as well as summer range for some, especially deer. Snags are an important component, offering food and nesting to flickers, nuthatches, woodpeckers and other cavity dependent species.

Intermediate sites (forest habitat type groups 3 and 4)- A mixed forest of lodgepole pine and Douglas-fir prevails. These forest types are found on the cool and moist aspects of ELU 4. Thinning underburns with mixed mortality occurred occasionally (perhaps every 40 years) during a stands biological life. Underburning would kill or weaken thin barked species such as lodgepole pine. Thick barked Douglas-fir would be more resistant to fire. This would lead over time to a stand of large old growth Douglas-fir intermixed with younger lodgepole pine. This forest type, as well as the cold and mesic forests, provides a dense forest old growth condition. This would be characterized by dense forest stands which provide heavy shade. Winds speeds would be low and humidity generally higher than surrounding areas. Plants

which are favored by more moist, humid and shady conditions would populate the forest. Stand replacing lethal fires did occur in this forest type on occasion which would kill most or all of the trees in the stand. This forest type is present in 35 percent of the Implementation Area. Of that acreage 5.9 percent is classified as old growth. The average stand size of this old growth is 20 acres.

Cold and mesic forests (forest habitat types groups 5 through 10) These are subalpine habitat types dominated by lodgepole pine in early to mid seral stages. Stands of subalpine fir and Engelmann spruce will dominate later successional stages, barring disturbance. Disturbance from lethal fires will maintain large portions of these forests in the lodgepole pine seral stage. Remnants which survive fire attain old growth forest characteristics.

The cool to cold, wet old growth areas occur in the upper elevations of the Implementation Area. These habitats have multi-layered canopies, a variety of downfall, and varying age classes of snags. Within the Implementation Area, this type of old growth is generally surrounded by younger evenage stands of conifers giving the old growth an interior forest condition. These old growth interior forests have multi-layered vegetation in the understory coupled with the light and climatic variables that offer a variety of niches for wildlife, some of which include insectivorous birds, small mammals, and raptors.

This forest type occupies 23 percent of the Implementation Area. Of that acreage, 7.7 percent of the forest is classified as old growth. The average stand size of this old growth is 39 acres.

Snags, in addition to dead and down material, supply food and nesting for cavity dependant birds as well as a variety of insects. The dark, more mesic environment provides a variety of fungi and insects which become food for small mammals and birds. Big game use these areas during the summer for thermal cover to reduce heat stress. During the winter these areas are important foraging and denning habitat for the pine marten.

Of the total area, old growth forests occupy 5.6 percent of the Implementation Area and average 28 acres in size.

Table III-11 summarizes the identified old growth on National Forest lands within the Implementation Area.

TABLE III-11 OLD GROWTH SUMMARY

HABITAT TYPE	FOREST TYPE	ACRES/ PERCENT	OLD GROWTH ACRES	PERCENT OLD GROWTH	ACRES AVER-AGE STAND SIZE	PERCENT OLD GROWTH IN HABITAT TYPE
1 and 2 warm dry site	Doug-fir savannah	4408/17	451	1.7	25	10.2
3 and 4 intermediate	mixed/Doug-fir	9231/35	547	2.1	20	5.9
5 and 10 cold and mesic	subalpine forest	5988/23	462	1.8	39	7.7
TOTAL		75	1460	5.6	28	N/A

Old growth forests are within the desired condition of the landscape analysis.

The Forest Plan states, "Five percent of each third order drainage should be managed for old growth. The priority for old growth acres within each drainage is: first, land below 6000 feet in elevation; second, riparian zones and mesic drainage heads; and third, management areas emphasizing wildlife habitat." (Helena Forest Plan II/20, 21).

An analysis of the acres of old growth, under National Forest management per third order drainage was conducted. The results are shown in Table III-12.

TABLE III-12 OLD GROWTH BY WATERSHED

NATIONAL FOREST WATERSHED	TOTAL ACRES	ACRES OF O.G.	% OF AREA	AVE. SIZE O.G. ACRES
Lambing/Priest	3,704	33	0.9	11
Benton	3,906	269	6.9	21
Slough Creek	2,167	325	85.0	27
Bridge Gulch	2,839	129	4.5	32
Mule/Atlanta Creeks	5,943	497	8.4	42
Beaver Creek	4,094	107	2.6	13
Rubison/Moonshine	3,413	100	2.9	25

In total, 5.6 percent of the Implementation Area contains old growth forest conditions. All forests in the Implementation Area are potentially old growth forests if they are protected from disturbance processes. For forests which undergo lethal processes an old growth forest is a periodic condition of the forest. Forests which have evolved with non-lethal processes have a more continuous old growth nature.

Some watersheds are below the Forest Plan minimum old growth recommendation. Watersheds in the Lambing/Priest and Bridge Gulch areas contain some warm/dry aspects which are often approaching Regional definitions for old growth conditions. Cool/moist aspects are uniformly mature mixed forests of lodgepole pine and Douglas-fir which will not attain old growth conditions for several decades. Warm/dry sites in these areas will provide old growth conditions in the relatively near future.

Potential old growth was identified. One hundred-forty eight acres were identified in Long Gulch, 69 acres of potential old growth were identified in Beaver Dam Gulch, 76 acres of potential old growth were identified in the Skidoo Gulch area, and 175 acres of potential old growth were identified in Lambing Gulch.

Portions of Beaver Creek and and most of the Rubison/Moonshine area are warm and very dry forest types. Often limber pine is a major component of these forests. While these stands do not meet Regional guidelines for old growth, they definitely contain an "old forest" character and will meet Regional guidelines within a few decades. These stands currently provide many of the characteristics associated with old growth forests. The processes of this forest type is not well understood at present and is under investigation. A total of 151 acres of potential old growth were identified in this area.

b. Bitterbrush

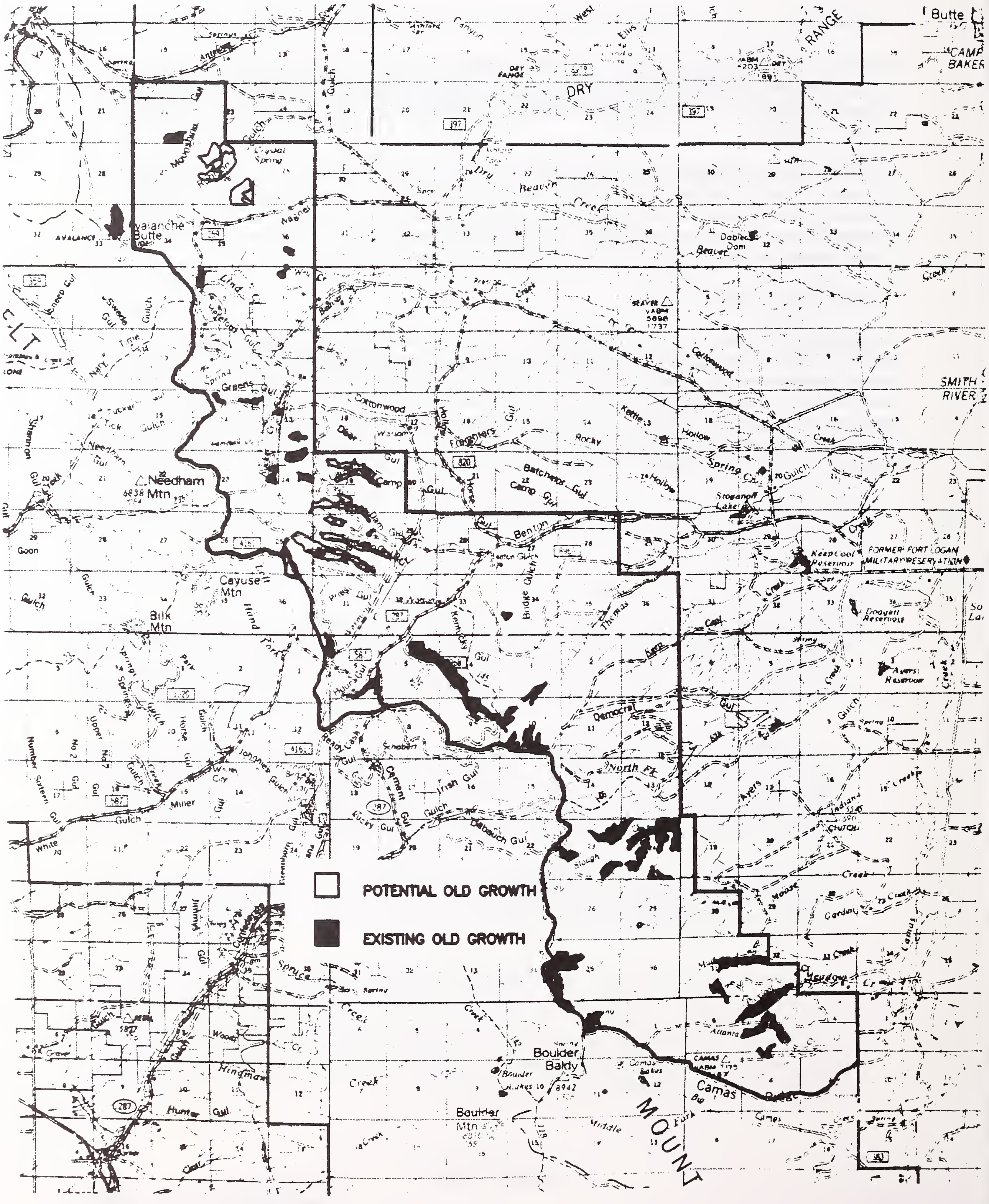
Bitterbrush habitat types have not been found within the Implementation Area. However, bitterbrush is a component of a Douglas-fir/rough fescue habitat type in the Ohio and Thomas Gulch areas. It occurs in shallow, rocky areas along the ridge that heads the Thomas, Ohio, Kentucky and Bridge Creek drainages.

Canopy closure of Douglas-fir has begun to shade out the understory. This has created a change in the soil chemistry. As the soil has become more acidic, the grasses have become less palatable and the bitterbrush mortality has increased. Remnant patches are very small, limited to a few plants scattered on the fringes of the coniferous canopy. Bitterbrush has also become more confined to the rocky, shallow soil areas that do not currently support forested vegetation.

c. Woody draw shrubs

Shrubs within this kind of community can be a mix of mountain maple, serviceberry, chokecherry, and snowberry. These are usually found in two kinds of sites within the Implementation Area. They include the understory of the more open Douglas-fir savannah south slope sites and draws of the cooler but open slopes. Shade or canopy closure is reducing and fragmenting these brushy types. Fire stimulates the root systems of many of these shrubs. Since fire has not occurred for several years on many of these sites, plants have become decadent and some species have limited presence on site. These areas are located in the Lambing/Priest and Ohio Creek areas.

MAP III-5 EXISTING & POTENTIAL OLD GROWTH



2. RIPARIAN

An unique feature of riparian areas are the successional stages and diversity of vegetation that exists within close proximity of each other. Riparian areas offer numerous niches for feeding, nesting, perching and cover. Riparian areas are among the most productive and valuable wildlife habitat wherever they occur. Elk, black bear, moose, songbirds, and a variety of small mammals predominately use riparian areas.

Riparian areas within the lower portion of the Implementation Area are dominated by grasses, shrubs, conifers and deciduous vegetation in various successional stages. Many of these communities are decreasing and changing character due to the influences of surrounding vegetation or human intervention. Featured vegetative species within riparian communities are aspen, sagebrush, cottonwood, and low elevation grasslands.

There are also many small wetland areas scattered throughout the south portion of the implementation area. They occur within the cool/wet and cool/moist conifer habitat types. Generally, these areas are less than an acre in size and may or may not have standing water surrounded by sedges and horsetail vegetation. Most areas are undisturbed and appear to be at potential in terms of vegetative composition and physical structure.

In general, the steeper gradients and colder climate associated with ELU 2 tend to promote riparian areas dominated by conifers. These sites often have a certain natural resistance to stand replacing fires due to their topographic position and mesic nature. Climax conifer forests of Engelmann spruce and subalpine fir are often found here. Following a major disturbance by fire these sites are initially dominated by lodgepole pine and deciduous vegetation such as alder, willow and aspen. Under climax conditions these species become suppressed and decline.

As streams flow downhill and gradients decrease, riparian areas naturally become wider, and more extensive. This is true of the riparian areas found in ELU 4. The processes affecting riparian areas have resulted in a reduction of riparian acres and changed plant composition. Shrub layers have been greatly reduced from grazing and mining. The loss of riparian old growth reduced the quantity of wildlife species using riparian areas. In turn, this has lowered the diversity and number of wildlife. Species affected include moose, mountain nesting ducks, ruffed grouse, bear and a variety of songbirds and small mammals.

Moose favor riparian areas containing willows, dogwoods, and poplars. Mature aspen and cottonwood are hosts for fungal infections and insects, which are the food for a variety of small mammals and birds. Coniferous and deciduous riparian areas surrounded by grassland/shrubland habitat supply cover and food for migrating birds in the fall in addition to serving as corridors.

a. Aspen

The majority of aspen within the Implementation Area is located from Big Camas Creek to Moose Creek. Both stable and seral aspen stands are present. The seral aspen is generally in close proximity to coniferous forest stands. Many of these stands are currently being colonized by Douglas-fir. Livestock and big game use of these area is further compounding the potential loss of the aspen community and regeneration.

Stable aspen stands are found on sidehills in open grasslands. The soil is rocky and shallow but does support healthy stands of aspen. Most of these stands are small and have spindly, pole-like characteristics. The understory consists of a mix of sagebrush and grasses. Due to the steepness and lack of palatable forage, these stands are not impacted to a great degree by ungulates. These stands,

however, are subject to wind damage which may explain why a large number of older trees do not exist in these stands.

Wind and heavy snowfall has caused a high mortality of aspen trees within about one-third of all stands in the Camas and Moose Creek area. Many of the trees older than 40 years have been broken off within the past five years. In many cases, mortality has not been high enough to create a favorable environment that would stimulate root suckering.

b. Cottonwood

Benton Gulch is the only location within the Implementation Area that has a cottonwood community. This area was placer mined so the stream does not function naturally. Cottonwood has started growing on the tailings and along parts of the floodplain. Regeneration is poor and understory vegetation is in a low seral stage.

c. Lower elevation grasslands

Lower elevation grasslands are unique in that they contain the largest concentration of aspen on the Townsend Ranger District (area between Big Camas Creek and Moose Creek). Furthermore, the soils have a clay layer that holds water near the surface throughout the forested/grassland interface. Small seeps and springs are scattered and provide countless riparian microcommunities. These perched water tables provide ideal conditions for the aspen communities.

3. THREATENED, ENDANGERED & SENSITIVE PLANT SPECIES

The Implementation Area consists of a variety of habitats that have the potential to support sensitive plant populations. Table III-13 contains a list of sensitive plants that may occur on the Helena National Forest, habitat affiliations, and the likelihood of occurrence within the Implementation Area.

TABLE III-13 T/E/S/ PLANTS

SPECIES	HABITAT	OCCURRENCE
Pink agoseris	6150-9500' cold wet meadows saturated through out the growing season	Possible, low probability Atlanta/Mule/Pickfoot spruce forests
Short-styled Columbine*	mid elevations cliff & crevice in rocky talus,rocky talus, usually moist sites	No, lack of habitat
Maidenhair spleenwort	Open woods and streambanks, 5000' to 6000' ft. elev.	Possible in the project area south of Elk Creek in the lower elevations
Leadville mikvetch*	7300-8300' stabilized calcareous alpine and subalpine	Not likely, no subalpine or alpine calcareous soil
Peculiar moonwort*	4000-8000' moist shrubby meadows often near lake	Not likely[1]
Pale sedge*	calcareous	
Poor sedge*	3000 - 7000' peatland	No

SPECIES	HABITAT	OCCURRENCE
Yellow lady's slipper	3000-6200' organic soils, moist coniferous forests, seepage areas and moist ecotones between peatlands and upland forest	Possible, Mule Creek ponds
Sparrow's-egg lady's slipper*	3200-5700' peaty soils in ecotone between wet mossy coniferous forests and wetlands or streams	No, lack of habitat [1]
Linear-leaved sundew*	4700-6000' peatlands on floating organic mats	No, lack of habitat [1]
Giant helleborine*	3000-5800' warm springs and seeps on the edges of peatlands	No, lack of habitat [1]
Green-keeled cottongrass*	3100-4750' in Carex dominated peatlands	No, lack of habitat [1]
Northern rattlesnake-plantain	Limestone slopes in old growth forests, 5700'-6100' elevation	Possible in Rubison Creek & Moonshine Creeks on DF mature & old growth sites
Hall's rush	4000-8400' in montane and subalpine moist to moist to wet meadows	Low possibility, known south of project area. May occur in the upper elevation of Atlanta/Mule/Pickfoot Cr.
Round-leaved orchis*	3900-6000' organic soils/wet mossy coniferous forest edges near peatlands and streams	No, lack of habitat [1]
Stalked-pod crazyweed*	7300-8200' limestone alpine slopes usually with northern aspects	No, lack of habitat [1]
Missoula phlox*	3600-7540' usually gravelly windswept ridges, although sometimes in forb dominated meadows	Possible, low probability
Austin's knotweed*	5140-6600' usually moist barren shale slopes	Possible, low probability
Wolf's willow*	6500-9000' rocky clay-loam soils/montane to subalpine wet meadows most often riparian	No, lack of habitat [1]
Sawwort*	7500-8500' on open talus and loose scree/alpine, calcareous	No, outside range[1]
Storm saxifrage*	7800-10300' meadows, moist ledges and depressions which retain snow/krummholz/alpine	No, lack of habitat [1]
Water bulrush*	2900-6000' often submerged in 1-3 feet of water in quiet ponds and slough	No, lack of habitat [1]

SPECIES	HABITAT	OCCURRENCE
Alpine meadowrue*	6500-8200' alkaline meadows often beneath low shrubs	No, lack of habitat [1]
California false-hellebore*	Wet meadows and streambanks in montane & subalpine zones 6000' - 8500'.	No, lack of habitat [1]
Kidney leaved Violet*	3000-5000' organic soils, swampy spruce wood	No, Big Belts outside range [1]

1. Determination based on a survey completed on the Townsend District (Poole, J.M. and B.L. Heidel, 1993, Sensitive plant surveys in the Big Belt and Elkhorn Mountains. A report prepared by the Montana Natural Heritage Program for the Helena National Forest, 128 pp).

* Species that will not be further analyzed. Reasons for not considering these further include either a lack of potential habitat within the Implementation Area, a low risk of species presence or the area is outside the known range of the species.

D. FISHERIES

Streams within the Implementation Area comprise a relatively small portion of the greater Smith River drainage network, an integrated fluvial system originally predominated by native stocks of westslope cutthroat trout and arctic grayling. Resident westslope cutthroat were likely the only inhabitants in headwater streams. The introduction of eastern brook trout followed by rainbow, brown trout, and Yellowstone cutthroat plants into basin area streams and lakes contributed, in part, to the dramatic decline of native fish stocks in Implementation Area streams. Electrofishing surveys in the Implementation Area indicate that, with the possible exception of Slough Creek, pure westslope cutthroat trout no longer exist in this portion of the Big Belt Range. Resident trout populations have been documented in five streams with eastern brook trout the predominate species of salmonid fishes that occupy area streams.

A Fishery Resource Value Class (FRVC) rating has been assigned to the Implementation Area streams by the Montana Department of FIsh, Wildlife, and Parks based on fish abundance or size, ingress (legal access), esthetics, and fishing pressure. Values range from 1 (highest value fisheries resource) to 5 (limited fisheries resource) and 6 (unclassified). Only two streams received ratings: Beaver Creek and Benton Gulch. Both streams, however, lack fisheries on the Forest and hence, are outside streams targeted for analysis. Other streams are presently unclassified. However, this rating does not imply non-fisheries or poor fishery resource values. In many cases, there is often insufficient information to rate specific streams or stream reaches under this rating system. Therefore, many otherwise important tributaries for fish production are assigned to an unclassified level.

Based on electrofishing surveys, salmonid fish currently occupy 4.9 miles of stream in the Implementation Area. Perennial streams documented to be barren of fish include Beaver, Rocker, Thomas, Moose, and Mule Creeks. Benton Gulch may temporarily contain fish that migrate from year-round wetted reaches off Forest and Vermont Gulch during periods of spring runoff.

With the possible exception of Slough Creek, genetically pure westslope cutthroat trout are not present in the Implementation Area's streams. However, cutthroat trout in Slough Creek have not been sampled by electrophoretic analysis due to their extremely small numbers. Only three were captured throughout the extent of fish distribution. It is likely that these cutthroat could be migratory individuals from remnant populations from below the forest boundary that are pioneering into new habitat or the last individuals remaining of a local population prior to extinction.

Slough Creek, a second order tributary to Elk Creek, contains a small population of eastern brook trout distributed upstream 0.4 miles from the Forest boundary. Single-pass population evaluations with electroshockers reveal approximately 12 adult brook trout per 1000 feet of stream. Extensive electrofishing operations also uncovered a total of three cutthroat trout on Forest. Due to this extremely small number, no cutthroat were collected for genetic evaluation. The three cutthroat may be the "final thread" of existence of a former subpopulation that occupied the watershed or migratory individuals from remnant populations downstream that are pioneering upstream into forest stream habitat.

Not classified by the MDFWP, Slough Creek is a Rosgen B4 channel at the forest boundary dominated by gravel in the channel. Some cattle trailing areas along the stream corridor was evident with little damage to fisheries habitat. The stream quickly transitions into steeper, more entrenched A3 and A2 channel types 100 meters above the forest boundary providing a higher incidence of plunge pool habitat for trout. Evidence of past mining could be seen only by the presence of a remnant water diversion channel.

In general, habitat conditions improved markedly within the A type channels. However, low flows (1 cfs) and higher gradient channel profiles limited fish distribution to less than 0.5 miles of stream reach.

Elk Creek has a heavy concentration of brook trout distributed 0.8 miles upstream from the forest boundary to the confluence of two second order tributaries. No other fish species were found above the forest boundary. Surveys by state fisheries personnel in the late 1970s found rainbow and brook trout further downstream . Single-pass electrofishing evaluations indicate fish densities in Elk Creek near 200 per 1000 feet of stream. Approximately half of that figure were brook trout over six inches long.

Elk Creek is a third order stream of Rosgen B3 and B4 channel characteristics near the Forest boundary. The lower reaches are dominated by cobble and boulder channel materials and large woody debris that form frequent plunge pools and eddies for fish. Channel conditions, however, are impacted by cattle concentrating in the stream valley corridor directly above the property boundary fence. Cattle currently have access through portions of the fence crossing the valley bottom.

Average perennial flows appear double to that in Slough Creek, providing fish additional habitat and overwintering capacity. The channel transitions from the heavily forest canopied B channel to a lower gradient C4 type stream altered by extensive past placer mining operations. Vegetation regrowth is vigorous in disturbed reaches providing a measure of cover and bank stability to fish habitat. The channel remains unnaturally straightened and steeper than would occur in the absence of past mining operations.

Fish habitat in the Implementation Area is influenced by flow regimes and sediment supply that are a function of unique combinations of geology and landform (riparian aggregates) specific to local watersheds. Past beaver activity further influenced development of fish habitat components in low gradient stream reaches in the Implementation Area through expansion of meadow habitats and surface flows. Information from watershed data tables indicate intermittent stream channels make up approximately 52.5 miles (76%) of the total drainage network in the Implementation Area. Perennial stream reaches make up the remaining 16.8 miles of drainage network . In conjunction with ongoing natural and vegetative processes, past and current land use activities have provided the framework for a fragmented and altered riparian and aquatic network in the Implementation Area as well as throughout the Smith River drainage.

A severe storm in 1981 triggered flood flows in some drainages of the Big Belts causing local channel scour and redistribution of coarse sediments. Stream channels in the Implementation Area subjected

to past disturbance or channelized from historical mining practices and road building were more vulnerable to the disrupting effects of flooding.

Fine sediment (less than 1/4 inch diameter) in spawning substrates of fisheries streams in the Implementation Area ranged from 31 to 51 percent. Associated egg survival rates for these sediment levels were calculated ranging from 29 percent to 23 percent for cutthroat trout utilizing data from Bjornn and Irving (1984) and 62 percent to 34 percent for brook trout using data in Witzel and McCrimmon (1993). Rainbow trout egg survival rates were calculated using information in Stowell et al. (1983). In Vermont Creek, egg survival rates were at the extreme lower end, less than 0.01 percent, possibly jeopardizing continued survival of that population.

Table III-14 provides a summary of this information.

TABLE III-14 FISHERIES SUMMARY

STREAM	SPECIES PRESENT*	ESTIMATED ABUNDANCE 6" OR LARGER	FINE SEDIMENT IN SPAWNING GRAVEL	SALMONID EGG SURVIVAL RATES**
Atlanta Cr	Eb Ct	25/1000 ft 8/1000 ft	35.0%	56% 23%
Vermont Cr	Eb Rb	3/1000 ft 50/1000 ft	51%	34% .01%
Elk Cr	Eb	194/1000 ft	31.0%	62%
Slough Creek	Eb Ct	12/1000 ft 1/1000 ft	31.9%	60% 29%
Pickfoot Creek	Eb	30/1000 ft	ND	ND

*Eb = eastern brook trout, Ct = cutthroat trout, Rb = rainbow trout
**Trout embryo survival rates based on percent fine sediment less than 0.25 inch diameter within spawning substrates.

E. WILDLIFE

1. Introduction

A variety of wildlife species inhabit the Implementation Area. Many of these species inhabit a variety of habitats yearlong, while some are only seasonal residents. Past activities such as suppression of wildfires, timber harvest, hunting, road and trail development, motorized use, grazing of domestic livestock, restrictions on motorized use, and mining have affected wildlife within the Implementation Area. These impacts have resulted in changes in the relative abundance and diversity of wildlife species across the landscape.

Wildlife species considered for this analysis included USFS Region 1 Threatened, Endangered and Sensitive Species (TES) whose habitat requirements are at least partially met within the Implementation Area. In addition, Management Indicator Species (MIS) as listed in the Helena Forest Plan were considered for the vegetative communities found in the Implementation Area. Additional sections regarding songbirds and fragments/corridors/linkages were added to chapters three and four in order to respond to concerns raised during public review of the Draft Environmental Impact Statement.

The Implementation Area boundary defines the analysis area boundary for most wildlife species. Analysis areas for several other species differ, due to specialized habitats, wide-ranging habitats and herd ranges.

2. Threatened, Endangered and Sensitive Species

Within the Implementation Area, only a few conducted surveys have determined a presence or absence of threatened, endangered or sensitive species. For this reason, known suitable habitat is given as a means of assessing possible presence of a threatened, endangered or sensitive species. Data and reports published by the Montana Natural Heritage Program were used extensively for study of potential TES habitat. This section and the TES Effects section of the document will serve as the Biological Analysis for the project.

a. Threatened and Endangered Wildlife Species

The following table is a listing of threatened and endangered species that are possible on the Helena National Forest.

TABLE III-15 T/E WILDLIFE SPECIES

LISTED SPECIES	STATUS	EXPECTED OCCURRENCE
Grizzly Bear	Threatened	None
Gray Wolf	Endangered *	Not likely
Bald Eagle	Endangered	Possible
Peregrine Falcon	Endangered	Not likely

* As of November 22, 1995, all Helena National Forest lands east of Interstate-15 has been classified as the Yellowstone Non-essential Experimental Population Area for the wolf (see "Direction for the Implementation Area" under the Gray Wolf heading).

A letter of coordination (4/15/94) was sent to the Fish and Wildlife Service in order to confirm the listed, proposed and candidate species that may be present in the Implementation Area. Their response comments have been incorporated into the existing condition narrative and are also located in the project file.

Grizzly Bear: Federally listed "Threatened"

a. Direction for Implementation Area - The Implementation Area is not located within any Bear Management Unit (BMU), nor does the area fall under any management situation in the Recovery Plan.

b. Seasonal ranges and habitat components in Implementation Area - Historically, the Implementation Area probably supplied spring and fall grizzly bear habitat in the form of early spring flushes of grasses and forbs and carrion left from the winter. During the late summer and fall, berries would have been an important food resource.

Currently the Implementation Area is not occupied by grizzly bear at any time of the year. Because of the location of the Big Belt mountain range it is assumed that at some time the mountain range

served as a migration corridor between population centers of Yellowstone and Glacier National Parks. It is unlikely that this corridor can ever be restored due to the nature of the terrain, food availability and level of human development that currently exists along the route.

Gray Wolf: Federally listed "Endangered"

a. Direction for Implementation Area - The Implementation Area falls within the Yellowstone Non-essential Experimental Population Area. Under the authority of the Endangered Species Act, Section 10(j), a species of this designation "shall be treated, except when it occurs in an area within the National Wildlife Refuge System or the National Park System, as a species proposed to be listed under section 4; and (ii) critical habitat shall not be designated under this Act for any experimental population determined under subparagraph (B) to be not essential to the continued existence of a species".

b. Seasonal ranges and habitat components in Implementation Area - The Implementation Area lies on the eastern edge of the identified historical range of the wolf in Montana (USF&WS, 1987). Historically, the Implementation Area most likely supplied needed habitat requirements (prey base, den and rendezvous sites) to maintain wolves in the area.

Currently the Implementation Area is not known to be occupied by gray wolves at any time of the year. Because of the location of the Big Belt mountains it is possible that at some future time the mountain range may serve as a migration corridor between population centers of Yellowstone and Glacier National Parks. The probability for this to occur will be influenced by the open nature of the terrain and ever expanding human development that currently exists along the route.

Bald Eagle: Federally listed "Endangered"

a. Recovery Plan population target - The project is located within the Upper Missouri Recovery Zone, which has a target of ten nesting pairs. Currently there are a minimum of nine pairs within the zone (Bald Eagle Working Group 1991).

b. Habitat conditions in Implementation Area - Feeding habitat and nesting habitat are very limited within the Implementation Area. Birds have been documented during the spring along the Smith River and on adjacent private land. These birds feed on carrion, fish, rodents, and rabbits.

c. Population estimate in Implementation Area - No occupied nests occur within or near the Implementation Area.

Peregrine Falcon: Federally listed "Endangered"

a. Recovery Plan population target - The Implementation Area is not located within any recovery area for the peregrine falcon.

b. Habitat conditions - There is no known suitable habitat within the Implementation Area. Occasional foraging or migration may occur within or adjacent to the Implementation Area.

c. Population estimate in Implementation Area - No pairs are known to nest in the Implementation Area. In addition, there have been no documented sightings. The nearest known peregrine falcon occurrence is along the Missouri River in the northern portion of the Big Belt Mountains, approximately 25 miles to the west of the Implementation Area.

b. Sensitive Wildlife Species

Table III-16 lists sensitive wildlife species known to exist on the Helena Forest, their habitats, and expected occurrence within the Implementation Area.

TABLE III-16 SENSITIVE WILDLIFE SPECIES

SPECIES	HABITAT	OCCURRENCE	COMMENTS
Boreal Owl	Spruce-fir stands Secondary cavity nester	Possible Atlanta/Mule/ Pickfoot headwaters	Sensitive to disturbance during nesting season- May
Ferruginous Hawk*	Low elevation, short grass	Low possibility	Sensitive to humans. Known nests off Forest. Grazing impacts prey base.
Mountain Plover*	Shortgrass prairie	Low possibility, likely off Forest on private lands.	Associated with sparsely vegetated,low elevation range lands.
Lynx	SAF/LPP, all successional stages in upper elevations	Possible Upper elevations in timber and montane zone, south of Benton.	Cyclic populations vary with hare abundance.
Harlequin Duck*	Swift mountain streams	No	Sensitive to humans near nesting and brood rearing streams.
Fisher*	Old growth and young stands, riparian areas	No	Habitat use varies w/ season (winter/summer).
Flammulated Owl	Open conifer, esp ponderosa pine.	Possible	Some areas adjacent to range land or old growth DF or PP.
Columbian Sharp-tailed Grouse*	Mid to tall grass prairie.	No	Historical distribution not east of Continental Divide.
Black-backed Woodpecker	Burned or dead forest w/ numerous snags containing wood boring insects	Likely, throughout Implementation Area where dead stands exist.	Primary cavity nester. Requires dead heartwood for nesting & feeding.
Western Big-Eared Bat*	Various habitats with caves or tunnels.	Not likely	Sensitive to disturbance at roost sites.
Wolverine	Large tracts of boreal/montane forests with a diverse prey base. Feeds on anything it can catch, including carrion.	Sightings, 15-20 yrs. ago, unlikely today. Area likely to be on the edge of the known range.	Vulnerable to trapping and poisoning, intolerant of humans.

* Will not be addressed further within this analysis. Reasons for not considering further include either a lack of potential habitat within the Implementation Area, low risk of species presence or the area is outside the known range of the species.

Flammulated Owl

Associated with seral and climax late-successional forests, these owls are a secondary cavity nester which feeds almost exclusively on insects. They have been observed in a variety of habitats but seem to prefer mature, open-grown stands of ponderosa pine and Douglas-fir. Studies have quantitatively shown that flammulated owls prefer open mature vegetative structure with low to medium stem density (Goggans 1986, McCallum and Gehlbach 1988, Hayward and Verner 1994). Howie and Ritcey (1987) found that flammulated owls used Douglas-fir stands that had been previously opened up by selective logging 20-30 years previously, resulting in canopy coverages in the 35% to 65% range. hey also felt that small grassy openings (up to 5 acres in size) scattered through the forest enhanced ecotonal foraging opportunities. Snags are limited in the lower elevations of the Implementation Area where open roads allow good access for people cutting fuelwood. The feeding habitat for the flammulated owl is limited due to the secondary growth associated with the lack of fire activity in these habitats.

Black-backed Woodpecker

Black-backed woodpeckers are primary cavity nesters which inhabit coniferous forests. They excavate nest holes in snags and live trees with heart-rot. Engelmann spruce, Douglas-fir, lodgepole pine, ponderosa pine, and western larch have all been noted as nest trees (McClelland 1980, DeGraaf et.al.1991). Alpine fir apparently provides too soft a substrate for long term nesting. Aside from pure alpine fir stands, virtually any mature to late-successional conifer stand with an abundance of dead or dying trees will provide adequate nesting sites. Thomas (1979) listed an abundant supply of dead trees or live trees with deteriorating heartwood as a special habitat requirement for black-backed woodpeckers. As with most woodpeckers, the habitat versatility rating for these birds is relatively low (Thomas 1979). The presence of dead and dying trees, both in open feeding areas and in adjacent forested nesting stands, may be required to generate high population levels. Otherwise densities are typically low, with fluctuations corresponding to fire events.

Lynx

Lynx are found at higher elevations in spruce, subalpine fir and lodgepole pine forests of the Implementation Area. As solitary, wide ranging predators, lynx maintain low population densities, and are vulnerable to cyclic prey densities. Home range size varies with dispersion pattern of suitable habitat and with the abundance of prey. Males generally maintain larger home ranges than females. In Montana, Brainerd (1985) reported home range sizes of about 17 and 122 sq. miles for females and males respectively. Nellis (1989) felt that most ranges fell within the 5-20 sq. mile range.

Lynx require a mosaic of forest habitat conditions in order to hunt, travel, and rear young successfully (Koehler and Brittell 1990). Lynx need mature forest for denning, but early successional forest are required for hunting (Koehler and Brittell 1990).

In general, habitats that favor snowshoe hares will provide optimal foraging habitat. Lynx depend heavily upon snowshoe hares as their primary prey, and their population densities are usually tied to snowshoe hare abundance. In Washington, so year old lodgepole pine forest had the highest abundance of snowshoe hares; densities in these young early successional forests were 4-5 times greater than in 43 or >82 year old lodgepole stands (Koehler 1988). Koehler (1988) reported that snowshoe hare densities were significantly correlated with the densities of trees and shrubs less than 1.0 inch DBH. Therefore, preferred lynx foraging habitat consists of dense conifer seedling and

sapling stands that provide snowshoe hare cover and available browse (ie., lodgepole pine, Koehler 1990). Koehler and Brittell (1990) recommended that seedling/sapling stands within the lodgepole/ subalpine fir zone should be well dispersed among areas where lynx management is a concern. In essence, they are promoting habitat fragmentation as being beneficial for lynx. Furthermore, they recommend that harvest units should be at least 20-25 acres to provide hare habitat

Roads may disrupt lynx travel and hunting patterns, but they will travel down old roads less than 50 feet wide with good cover along both edges (Koehler and Brittell 1990) while high standard roads may eliminate a substantial area as suitable habitat. Changes in access affect vulnerability of this species to trapping and lynx are particularly vulnerable to exploitation by trapping (Bailey et.al. 1986).

Boreal Owl

These owls use spruce-fir forest types but will also use other forest types of the Implementation Area. Hayward (1989) reported that all forested sites within the spruce-fir zone are potential boréal owl habitat. He found owls nesting most frequently in mature or older stands located within subalpine fir habitat types. Cover types at the nest sites were mixed conifer (40%), aspen (21%), Douglas-fir (21%), and spuce-fir (18%). They are likely to occur in the upper elevations of the Implementation Area from Slough Creek to Atlanta Creek. Mature and older spruce-fir forest with moderate canopy cover and a patchy tree dispersion pattern appear to provide optimum foraging habitat (Hayward 1989). Dense regeneration and pole stands cannot be used effectively for hunting. Similarly, owls can only hunt the edges of clearcuts (Hayward 1989).

Wolverine

Associated with high elevation habitats, the wolverine prefers to be isolated. During summer wolverines are associated with high elevation and alpine areas. During the winter they occupy areas where prey is available. Wolverines eat anything they can scavenge. During the summer months this includes eggs, young of ground nesting birds, and small mammals. During the winter the major portion of their diet is made up of ungulates, carrion, and small mammals. Although wolverines can utilize almost any habitat and has a large home range they are intolerant of humans and are especially susceptible to trapping because of their eating habits.

Within the Belt Mountains wolverines were historically known to exist as far south as the Implementation Area boundary. Currently there have been no documented sightings of the wolverine for the last 10-15 years. This lack of sightings or trapping has resulted in the conclusion that due to vulnerability associated with the fall and winter habitats, wolverines no longer find the area suitable. Although the Belt Mountains offer the variety of habitats needed in conjunction with large expanses of continuous coniferous cover the high road density associated with the influx in humans has reduced the habitat potential. Effects of roads and fragmentation discussed with the pine marten apply to the wolverine.

3. MANAGEMENT INDICATOR SPECIES (MIS)

The Forest Plan provides direction to maintain viable populations of all wildlife species. Indicator species represent a larger group of species requiring similar habitat attributes. In theory, if habitat is missing for the management indicator species, it is likely that the habitat is missing for the majority of the group that the indicator species represents. Within the Helena Forest Plan, several species are designated as MIS.

TABLE III-17 MANAGEMENT INDICATOR SPECIES

HABITAT	INDICATOR SPECIES	LOCATION
Mature Tree Dependant	Marten	South of Mule Creek
Old Growth Dependant	Goshawk Pileated Woodpecker	Mule Creek, Atlanta Creek Not present; MIS for Lincoln Ranger District only on Helena National Forest.
Snag Dependant	Hairy Woodpecker	Throughout the area
Commonly Hunted	Elk Mule Deer Bighorn Sheep	Throughout the area Throughout the area Not present on either a yearlong or seasonal basis. Occasional temporary drift of individuals from the Gates of the Mountains population is suspected.
TES	Grizzly Bear Gray Wolf Bald Eagle Peregrine Falcon	Not present Probably not present Possible; habitat is limited Probably not present
Fish	Cutthroat Trout	Atlanta and Slough Creeks

a. Elk (commonly hunted)

Elk occur throughout the Implementation Area on both Forest and private lands. Elk vulnerability has emerged as a central issue in managing elk on public lands. Initially, the Thomas-Benton herd unit was the geographic basis for assessing elk vulnerability, but upon review it was decided that the herd unit assessment did not realistically portray the conditions within the Implementation Area. Therefore, a second analysis specific to the Implementation Area was completed to augment the initial analysis.

The Thomas-Benton herd unit spans the entire Implementation Area as well as lands to the south. Elk summer in the upper elevations of the western portion of the herd unit and winter on the fringes of public and private lands, concentrating in the Thomas Creek, Mule Creek and Atlanta Creek drainages. Higher elevations along the crest of the Big Belt Mountains are also summer range for elk that winter on the west side of mountain range. Table III-18 displays elk herd distribution on public and private lands.

Patterns of elk use have changed in the last 10-15 years due mainly to timber harvest and increased road access in the Atlanta/Mule Creek, Slough Creek, Camas/Little Camas Creek, and Long Gulch areas, road and area closures throughout the Implementation Area, and increased numbers and changing patterns of hunters. Winter range is limited on public lands but Camas Ridge, Mule Creek and Thomas Gulch are three winter ranges within the Implementation Area that are generally used every year. Migration occurs south and west to spring, summer and fall ranges and then back again for winter. Elk are scattered throughout the Implementation Area during the hunting season but significant numbers migrate to private lands where hunting pressure is very limited.

1. Elk Vulnerability

Elk vulnerability is a measure of elk susceptibility to being killed during the hunting season and the probability that elk are displaced from preferred habitats. Elk vulnerability is the sum of many factors such as security, hunter opportunity, hunter behavior, and elk behavior (Lyon and Christensen 1992). Within the herd unit and the Implementation Area, elk vulnerability will be measured on the basis of security and hunter opportunity. For these analysis areas the predominant quantifiable measure of hunter opportunity is open road density during the general hunting season. Other factors that influence elk vulnerability include habitat topography, hunting pressure, and type and length of hunting seasons.

•Habitat Cover

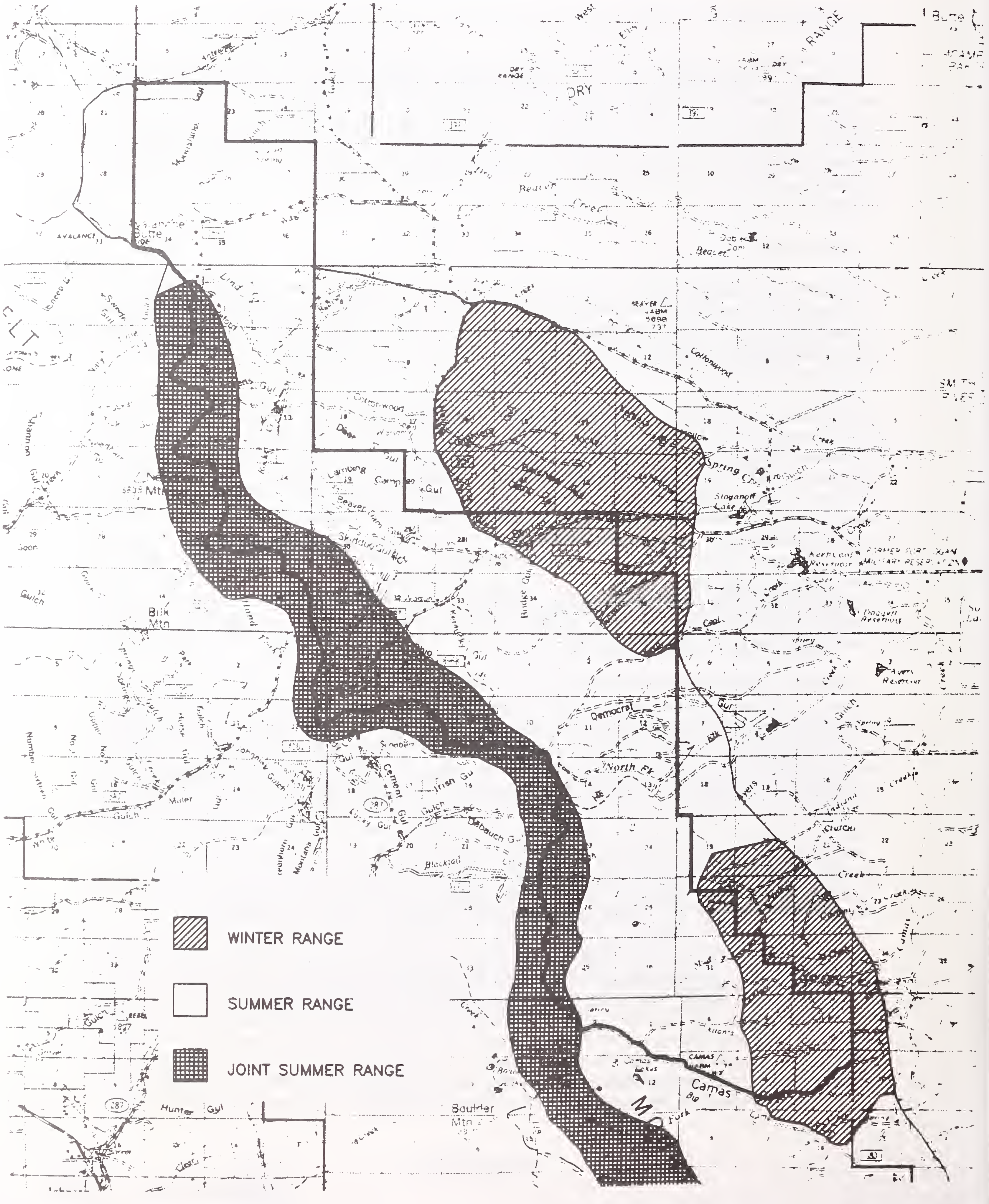
Cover/forage ratios are indicators of how well an area can support elk. The Forest Plan states that a minimum 35 percent of summer range will be maintained as hiding cover. Because the Forest Plan does not take into consideration the spatial arrangement of the hiding cover and these standards assume that a closed road is equivalent to having no road, the current Forest Plan direction does not adequately address the issue of elk vulnerability during the hunting season.

The Forest Plan defines elk hiding cover as cover that hides 90 percent of an elk at 200 feet or a stand of coniferous trees having a crown closure of greater than 40 percent. In addition, it should be explained that elk hiding cover does not necessarily provide security; stands that may not meet the definition of hiding cover may well be security given local conditions of topography, location and size. In order to better address the issue of elk vulnerability the Forest has opted to implement the Hillis et.al. method of determining elk security. The Hillis Paradigm states for an area of hiding cover to be considered secure, an area must be > 250 acres and be > one half mile from an open road during general hunting season. For the purposes or this analysis, the Hillis Paradigm was use in concert with hiding cover defined as >40 percent crown closure. Any hiding cover < 250 acres was defined as "Hiding cover which doesn't necessarily provide security". Security as a percentage of the herd unit/Implementation area and the ratio of hiding cover to open roads will be the quantifiable methods used to assess the impacts of alternatives.

The herd unit and Implementation Area on public lands has been split between the north and south portions, with the break occurring at the North Fork of Elk Creek. This was done to portray the difference in elk vulnerability that exists between the northern and southern portions of these areas. The southern portion of the unit is occupied by mesic mixed forests (lodgepole, Douglas-fir, subalpine fir, and spruce) with a fairly homogeneous canopy, whereas the northern portion of the herd unit is droughty, dry site forests with inclusions of grasslands. The northern portion is naturally fragmented with the timber occurring in narrow bands that extend into the grassland. The forest is predominately Douglas-fir with lesser amounts of limber pine and lodgepole. Within the northern portion of the herd unit seven percent of the forested areas has been harvested and an additional 25 percent is in grassland character. Because of the inherent openness of this area motorized use and foot/horseback travel is not particularly challenging. Hiding cover is less than 30 percent and because of the site characteristics it is unlikely that greater percentages could ever be maintained.

Using the security as a function of elk vulnerability, 30 percent of the herd unit/Implementation area is recommended to be in security in order to maintain a first week bull harvest of less than 40 percent. In the northern portion of the Implementation Area, the 30% figure may be approaching the maximum security which may be attained. Currently, of the total area within the Thomas Benton Herd Unit, 31 percent is in security and of the total area within the Implementation Area, 21 percent is in security. The security is not well dispersed throughout the herd unit/Implementation Area it is skewed predominately to the southern portion of these areas. Existing condition within the Implementation Area shows us that the area north of the North Fork of Elk Creek only displays 7 percent of the total security.

MAP III-6 ELK HERD UNIT - SUMMER & WINTER RANGE



• Management Policies

From the 1980's to the present time access to public lands has increased with the Atlanta Mule Road (5 miles), new road from Blacktail Creek into Slough Creek and additional roading within the Little Camas drainage. These areas were previously accessible by either very low standard roads that were usually developed for mining purposes or routes that required access from private lands. In conjunction with the roads in Little Camas reduction in cover also occurred. On private land, cover reduction was and still is occurring along the private/public border near the Implementation Area. Most of the private lands (Birch Creek to Rubison) are under lease to outfitters. The private lands have become inaccessible to all but fee hunting. The bordering private lands between Benton Gulch and Birch Creek have approximately three percent cover. Public hunting is very limited on these private lands.

Since about 1978, a substantial number of yearlong and seasonal road and area closures have been implemented to limit motorized use. Most new roads constructed during this period contain some motorized use restrictions during the hunting season. The Atlanta Creek Road, although closed near the Forest boundary, has provided public access to a large tract of public land in the Atlanta and Mule Creek areas. Prior to construction of this road, access to the area was difficult unless permission could be obtained to access from adjacent private lands. User compliance with road restrictions is generally good. Most of the violations occur during hunting season on roads that had historically been unrestricted. Compliance is usually better when restrictions are imposed on new roads before public use becomes established.

Prior to access and harvesting, the southern portions of the Implementation Area existed as a large expanse of contiguous canopy. Currently, within the southern portion of the Implementation Area approximately seven percent has been harvested and another 16 percent of the area consists of natural openings. Hiding cover exceeds 50 percent. Roads bisect much of the area but a few large expanses of unfragmented habitats do exist within or adjacent to the Implementation Area. The Birch Creek basin (most southern portion of the herd unit) is adjacent to the Implementation Area and is unroaded and unfragmented. The Boulder Baldy Mountain area is within the Implementation Area and remains unfragmented. Both these areas occur at upper elevations.

Although cover does exist beyond what has been identified as security, the current travel plan allows access preventing these from being used as security. The lower elevation herd unit is bisected by roads through much of the area. Roads have the effect of funneling humans during the hunting season, even while closed. Having closed roads within the security makes the area less secure, yet it is better than an open road. There are currently 81 miles of roads within the Thomas-Benton EHU that are open to motorized use during the hunting season. The present open road density is 0.98 miles per square mile during the hunting season.

• Human Variable

The outfitters do not hunt the elk excessively on private lands which has the effect of creating a sanctuary on non-public lands during the hunting season as hunting is not open to the general public. From the beginning of bow season to the end of rifle season the majority of elk that summer on the forest reside on private land. The proportion of total elk remaining on National Forest, during general season, is below post-settlement historic projections even though elk numbers are the highest they have been since the 1940's. The public lands are less able to hold elk due to the increase in accessibility or a decrease in security. Because the private lands have low hunting pressure and no access, they have become sanctuaries able to hold the majority of elk.

TABLE III-18 THOMAS-BENTON ELK HERD UNIT SUMMARY

ATTRIBUTE*	PUBLIC LANDS	PRIVATE LANDS
Acres of summer fall range	33,856	14,707
Acres of joint summer range	14,763	-0-
Acres of winter range	4,263	13,091
Total acres for Thomas-Benton Herd	52,882	27,798
ORD mi/sec (rifle season)	.98	not open to public
ORD mi/sec (summer)	1.6	not open to public
% of area in security	31%	100%
acres in security	16,998	27,798

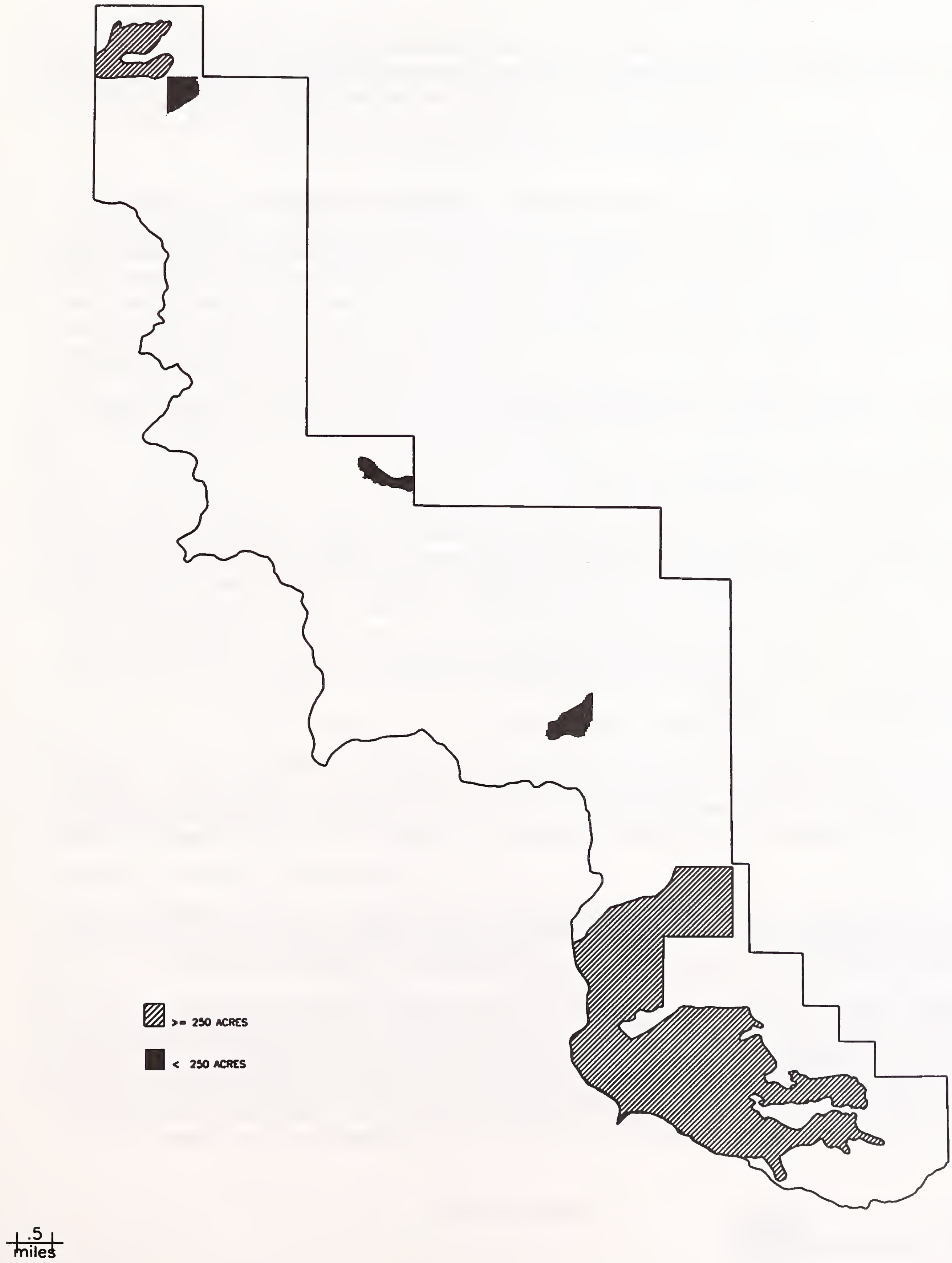
*Attributes listed in the chart are described below. Map III-7 displays the Herd Unit, distribution of summer and winter ranges.

Acres of seasonal ranges - Determined in conjunction with FWP, based on radio telemetry and professional judgement; **joint summer range** is that area within the herd unit that is shared with the elk herd units on the west side during the summer.

ORD - Miles of open road per square mile on public lands.

% of area in security - Percent of the public/private lands within the herd unit that is in security.

MAP III-7 ELK SECURITY



b. Pine Marten (mature tree dependent species)

Pine marten is an indicator used to monitor the quality of large continuous blocks of mature cover. Martens use mature to old growth spruce/fir stands for denning, with stumps and downed logs being critical components. Pine marten occur only in the higher elevations of the Implementation Area and probably at very low densities. They prefer mature forests, especially during the winter. This is related to snow depths and density of preferred prey.

Pine martens have historically occupied the area. Because of historical and continued logging and roading, fragmentation of coniferous cover has reduced the habitat suitability. Although the Big Belt Mountains tend to be inherently open and fragmented with inclusions of native grasslands, the southern portion of the Implementation Area is primarily a closed canopy coniferous forest composed of mesic to wet habitat types.

The Region One Habitat Suitability Model was used to determine suitable home ranges within the Implementation Area. One large home range of about 12,000 acres occupies a part of the Implementation Area. In addition, a smaller home range occurs south of the Implementation Area in the Birch Creek basin. These two areas are separated by grasslands as well as development. The large home range that occurs partially within the Implementation Area would support approximately three pair of marten based on acreages and habitat types. The continuous canopy cover (>50%) has less than five percent of the area in open parks included in it. Although the potential existed to have other areas meet the habitat requirements for the marten, because of development these areas are no longer adequate. The pine marten requires 2000 acres for a home range. Denning and foraging habitat is at or near the low threshold due to site characteristics (rocky, low amount of downfall).

c. Goshawk (old growth dependent species)

The goshawk is indicative of habitat with the structural characteristics of late-successional forests and are resident in the analysis area. There are currently two nests identified which were active in 1994. Douglas-fir and western larch have been reported to be the preferred species of nesting trees in the northern Rockies (Warren 1990), however Hayward (1983) and Patla (1989) noted use of lodgepole pine. Lodgepole pine has since emerged as a favorable nest tree species, as evidenced on the Beaverhead NF, a significant percentage (61%) of the time and are usually in close proximity to an opening and water source (Lemke 1994). The identified nests within the analysis area both occur in mature lodgepole.

The primary prey of goshawks in the Northern Region includes red squirrels, ground squirrels, snowshoe hares, woodpeckers, flickers, jays, grouse, robins and other passerine species (Warren 1990). Goshawk territories, post-fledgling areas, and nest areas were determined using "Management Recommendations for the Northern Goshawk in the Southwestern United States" (Reynolds 1991).

There are currently two active nests sites within the southern portion of the Implementation Area. Although exact nest locations will not be revealed, characteristics of those sites will be used to determine other areas of suitability for nesting and foraging in the Implementation Area.

Within the Implementation Area, goshawks nest and forage in the southern portion of the area within ELU 2 and wet portions of ELU 4. The nest sites are established in mature lodgepole with scattered old growth trees bordering open rangelands and/or clearcut forest. The nest stands are a combination of mixed Douglas-fir and lodgepole with heavy conifer regeneration grading into solid mature lodgepole with little understory. Some areas within the nest stand also contain small to medium height shrubs. Both stands are within 1/8th of a mile of large contiguous grasslands and water.

- Nest area A is a mixed Douglas-fir/lodgepole pine stand with Douglas-fir regeneration. There are some snags and downfall within the stand. The nest tree is a lodgepole pine with a 12-14" DBH (diameter of breast height), located on a north slope with a few large Douglas-fir.

- Nest area B is located in a stand with an upper canopy of mature lodgepole pine and Douglas-fir, and a lower canopy made up of alpine fir, Douglas-fir and spruce. The nest is near a creek and on a north aspect.

These nest stands represent an edge ecotone that is a combination of the grass/forb and mature to old growth coniferous stages resulting in habitat edge of high contrast. Literature on other studies support that goshawks are opportunistic and the availability and abundance of prey are factors in nest selection which may have prompted these particular nest site selections.

TABLE III-19 GOSHAWK TERRITORY SUMMARY

TERRITORY ID	TERRITORY ACRES	NESTING ACRES	POST FLEDGLING ACRES
Area A	4054	70	636
Area B	5184	93	512

d. Hairy Woodpecker (snag dependent species)

Hairy woodpeckers are the snag indicator usually associated with recent diseased, dead or dying trees. They often reside and utilize stands that have greater than 65 percent canopy closure of Douglas-fir, subalpine fir or spruce. Suitable habitat is defined as those stands with less than 50 percent lodgepole component with greater than 65 percent canopy coverage of Douglas-fir, subalpine fir or spruce. Within the Implementation Area, snags are locally abundant in mature and old growth stands in the mesic forests but limited on the dryer forested sites. The following table displays existing habitat in the Implementation Area. The Big Belts Integrated Resource Analysis indicates that snags are resource of cyclical nature across the range. Episodes of fire would have provided peaks in densities of snag resources.

TABLE III-20 HAIRY WOODPECKER HABITAT

HABITAT	ACRES
Suitable	10,630
Unsuitable (Previously harvested & poor site characteristics)	26,030

e. Mule Deer (commonly hunted species)

The Rocky Mountain mule deer, such as found in the Implementation Area, is the most widely distributed of all mule deer subspecies (Wallmo 1978). As such they are adapted to an extremely broad variety of habitats. In general, mule deer favor semiarid, open forest, brush, and shrub lands associated with steep, broken, or otherwise rough terrain (Mackie et al. 1982). Mule deer in the mountain/foothill habitats of the Belt Mountains are migratory. In summer they can be found in most habitats but are restricted in winter because of snow. In winter they are often found on lower south-facing slopes where there is less snow and more abundant shrubby vegetation for forage (Mackie et al. 1982). These same shrubs are also important for cover.

Within the Implementation Area mule deer occupy a variety of habitats. Wintering animals occur on the dryer, warmer sites found at the lower elevations of the Implementation Area. Migration to and from summer range occurs east to west with summer range consisting of the entire Implementation Area.

f. Bighorn Sheep (commonly hunted species)

Bighorn sheep are currently found only in the northern portion of the range, around the Gates of the Mountains Wilderness Area. One hundred and thirteen sheep were reintroduced on the Beartooth Wildlife Management Area from 1971 to 1975. Today, this herd numbers approximately 75 animals (F. Feist pers. comm. August 14, 1992). A 1988 pneumonia epidemic greatly reduced this herd from its high of approximately 400-500 head and they show no signs of recovering. A restricted hunting harvest (<5 either sex) is allowed in the Gates of the Mountains area (HD 455).

Although the only existing viable population of bighorns are those using the Gates of the Mountains, five bighorns rams were reported on Mt. Edith by a hunter in 1990 (Tom Carlsen, Pers. Comm. 1991). Occasionally, bighorn sheep skulls are found throughout the mountain range. It is unlikely that these sheep were residents and were perhaps dispersing from other populations or unsuccessful transplants. Although the Implementation Area does have sheep habitat, the habitat is limited and no resident populations exist.

g. Pileated Woodpecker (old growth dependent species)

The pileated woodpecker is an indicator species for the Lincoln Ranger District portion of the Helena National Forest. The species is not known to occur within the Implementation Area.

h. Grizzly Bear, Gray Wolf, Bald Eagle, Peregrine Falcon (TES species)

These species are discussed earlier in the Threatened, Endangered and Sensitive Species section of this chapter.

i. Cutthroat Trout (fish species)

Cutthroat trout is the management indicator species for fish. Cutthroat are discussed under the Fisheries section.

4. COMMONLY HUNTED SPECIES

There are eight known species of big game that occupy the Implementation Area at least seasonally; elk, mule deer, black bear, pronghorn antelope, moose, bighorn sheep, mountain goat, and mountain lion. Elk, mule deer and bighorn sheep are discussed as a management indicator species (MIS).

Current management of big game species is accomplished through use of hunting permits in designated hunting districts, as well as other methods. Currently all big game species listed above, except for bighorn sheep and moose, are managed through hunting. In addition, mountain lions and black bears are occasionally trapped and removed as predator control measures for conflicts with livestock grazing.

a. Moose

The Shiras moose, a northern Rocky Mountain subspecies, is native to Montana. Moose may be found throughout the Big Belt mountain range. Because of their solitary nature coupled with a lack of moist early successional or riparian habitats (Franzmann 1978), moose densities in the Implemen-

tation Area are low. Although moose do use nearly all types of mountainous habitats, moose densities seem to be roughly correlated with the extent of swampy, boggy, riparian types found in a general area.

Consistent moose use is found south of Elk Creek. Most habitat is located in the willow meadows on the private lands adjacent to the Implementation Area (Camas to Gipsy Creek). Moose migrate seasonally through the area, generally in an east to west pattern. The heaviest travel area is found south of Camas Ridge (Gypsy Creek to Duck Creek).

b. Mountain Goats

Mountain goats are not native east of the Continental Divide in Montana. They were introduced in the Gates of the Mountains in 1951 and at Mt. Edith in 1970 and 1971. In the Big Belt Mountains, mountain goats are often associated with alpine habitats (ELU 2) or with the steep, rugged limestone outcroppings as found in Avalanche Gulch or in the Beaver Creek canyon above the town of Nelson.

Mountain goat numbers, population dynamics, and distribution are poorly understood in the Big Belt Mountains because they are difficult to count and are a lower priority for management. Within the Implementation Area, mountain goats gather during the summer in the vicinity of Mount Edith. This population is thought to be stable or decreasing in numbers because of a lack of suitable habitat and emigration to adjacent population centers (Avalanche Creek).

c. Black Bear

Black bear can be found throughout the Implementation Area. They are known to range widely and use nearly all types of habitats. Within the Implementation Area, habitats important to the black bear include: riparian areas used in the spring through the fall for foraging and security; dry south slopes during the spring for foraging insects and early greenup species; and closed canopy mesic forests for winter denning, summer foraging and security.

Within the Implementation Area, black bear are present at a low density. Because of the low productivity of biomass associated with many of the habitats, coupled with the fact that there are only small amounts of the highly productive bear habitats (riparian), it takes a substantially greater amount of area to support and sustain a bear.

Low black bear numbers within the Implementation Area may also be a function of management actions or human encroachment. Roads, trails, and campgrounds are examples of facilities that increase human use in bear habitat that had been previously undeveloped. These developments can have a negative effects on bears by increasing human/bear contacts and by funneling hunters. Human/bear conflicts can result in a direct loss of the bear (grazing conflicts) or an indirect loss of the bear from the system by further pushing the black bear into uninhabited areas. Bears are hunted in the spring and again in the fall. Funneling caused by roads has a greater impact in the spring than in the fall due to habitat and food preferences.

d. Mountain Lion

Like the black bear, mountain lions are solitary animals. Although lions are known to inhabit the Belts, specifically very little is known. It is believed that mountain lion numbers are probably higher now than they have been for a number of decades. A limited harvest of lions based on a quota system is allowed in the Big Belts area.

Home range size depends on sex and reproductive status. For males, home range size varies from 15-31 square miles and, for females, home range size varies from 25-35 square miles (Russell, 1978).

Home ranges of males have little overlap but may overlap substantially for females. (Steidensticker and others, 1973). Lions are distributed by the way their prey is distributed. The lions' primary diet element is deer, however, elk can also be a large portion of their diet, depending on availability (Russell, 1978). By maintaining areas of seclusion and a solid prey base (mule deer) a viable population will continue to be maintained.

e. Pronghorn Antelope

The Implementation Area does not host typical antelope habitat. The Implementation Area is predominately forested and mountainous, although some antelope have been documented on the northeastern fringes of the area that borders public and private land in Thomas Gulch. Summer use is minor, with the other seasons having no use. The low amount of antelope use is due to site characteristics rather than management. The limited population of shrubs and hilly terrain account for the low to minor use within the analysis area.

f. Forest Songbirds

The range of habitats available within the Implementation Area historically and currently supports a wide variety of songbirds. However in recent years, breeding populations of previously widespread and common songbirds have been observed to be declining in trend (Terborgh,1989; Ehrlich, Dobkin, and Wheye 1992). Of these song birds, it is the neotropical migrants that are of particular concern. There are many potential reasons for this marked decline. Studies have pointed to tropical deforestation impacting winter habitat (Ambuel and Temple 1982), competition with edge-habitat species in small forests (Askins and Philbrick 1987), and nest predation and parasitism by species such as crows and brown-headed cowbirds which are more effective near edges and in small fragments (Gates and Gysel 1978, Brittingham and Temple 1983, Wilcove 1985). However, our literature search turned up little information as to songbird vulnerability within a naturally fragmented landscape such as the eastern Big Belts. Fire ecology results in this area have shown this area to be prone to large scale natural events within ELU 2 which fragmented large areas while in ELU 4 inclusions of native grasslands into open conifer savannah were maintained by more frequent small events. Intuitively, historic processes had the effect of occasionally displacing specialist species to the benefit of generalist species until habitat reappeared through succession. Existing condition favors edge habitat species including the brown-headed cowbird with the deviation from historic conditions found within ELU 4. The encroachment of conifers into grassland and formerly open conifer savannah provide habitats that were not historically available. Similarly, the exclusion of fire from ELU 2 has somewhat limited the generation of structure typically associated with old growth habitats that results from low intensity fires associated with large events. In other words, forest interior songbirds are most likely being influenced by the lack of mosaic creation resulting from fire.

g. Fragmentation, Patch Size, and Biological Corridors

The effects of fragmentation, patch size, and effectiveness of corridors depend upon the type of organism, type of movement, and the type of corridor (Hunter 1990). There is no doubt that the Big Belts have served as a biological corridor between northern and southern portions of the Continental Divide in the past. There is some question as to their effectiveness at present due to the level of human development which is expanding in the valleys surrounding them. Some species such as the wolf are more likely to skirt civilization than species such as the grizzly bear. For seclusive wide-ranging species such as the wolverine and lynx it is unlikely that the Big Belts ever served as much of a corridor. For species such as these any biological corridor potential has been lost. Fragmentation at a larger scale surrounding the Big Belts has, for the most part, isolated them. The only potential linkage area of the Belts exists at the north end.

Patch size within the Belts has probably increased in some areas due to exclusion of fire. While in other areas, varying levels of harvest have decreased the patch size. The heavily roaded nature of the Implementation Area disrupts many ares which would serve as linkages without the roads.

The northern portion of the Implementation Area is a difficult area in which to assess the effects of fragmentation as it is an inherently fragmented landscape. Forest stringers follow water sources in linear patterns along canyons while ridges are composed of inclusions of native grassland. This area of the Big Belts also serves as a linkage between the contiguous cover of the south belts and similar areas to the north (ELU 2). These areas of continuous cover are relatively unfragmented. They are also partially comprised of roadless areas which are presumed to be refugia for the rare seclusive species such as lynx and forest interior songbirds. Had fires been allowed to take their natural course these areas might be highly fragmented as a result.

SOCIAL ENVIRONMENT

An ecological system at any geographic scale is the interdependent relationship of plants, animals, people and the ecological processes that link them with the physical environment of an area. The values placed on the Big Belt Mountains by modern day users, in addition to its natural scenic and wildlife viewing amenities, include livestock grazing, mining, lands and special uses, and recreational uses of all kinds. The existing conditions of these uses are detailed below and in associated appendices. In addition, the social and economic trends of the area are summarized below.

A. SOCIAL SETTING

The Implementation Area is located in Meagher County, Montana. The nearest town is White Sulphur Springs. The second closest is Townsend, in Broadwater County. Meagher and Broadwater Counties are sparsely populated and rural in nature. They include a mix of agricultural lands (farming and ranching) and forested mountains (mainly National Forest system lands). The population of these two counties has remained fairly stable for the last 20 years. However, during the period from 1980 - 1990, they saw a decrease in residents, during a time the State showed a slight increase in population.

Aside from the availability of many dispersed recreation opportunities which are located on National Forest system lands, water recreation attractions in the counties are highlighted. In Meagher County, Smith River floating activities have grown in popularity and use dramatically over the last ten years. In Broadwater County, Canyon Ferry reservoir provides fishing and water related recreation opportunities on a year around basis. Both of these attractions bring people from outside the Counties to the area.

B. ECONOMIC SETTING

The economies of Meagher and Broadwater Counties are somewhat diverse with agriculture being the largest contributor. Retail and service industries are also important economic factors. Manufacturing wood products is a significant industry in Broadwater County, but not in Meagher. The local economic trends from 1983-1990 have been stable with a modest increase in nonresident travel contributing to local economies through purchase of goods and services.

The closest large sawmill is located in Townsend. There are also post and pole yards in both counties. In the state of Montana, including the local area, timber supply has become a significant issue to many people working in the wood products industry and related businesses. The timber from National Forest system lands has been and remains an important source of raw material for the local wood

industry. National Forest timber sales also contribute dollars to the local counties via the 25 percent fund which help the counties fund schools and roads.

The per capita income of the State of Montana was 82 percent of the national average in 1991. Both Meagher and Broadwater counties were below the state average.

C. RECREATION

The Implementation Area provides a variety of recreational opportunities and receives a moderate level of use compared to other areas of the Forest. Most use in the area occurs during the hunting season. Other uses include viewing wildlife and scenery, off-highway vehicle (OHV) and 4 x 4 vehicle driving, hiking and gathering of forest products. There are no developed recreation facilities within the Implementation Area.

The most common species hunted are big game and upland game birds. The highest use occurs in areas that are open to motorized vehicles (Wagner Gulch area south to Ohio Gulch). Outfitter guided day use occurs during general hunting season in the Thomas and Elk Creek drainages.

Wildlife and scenery viewing is popular along forest roads 4161 (Wagner Gulch to Confederate Gulch), 575 (Atlanta/Mule Road), and the Camas Ridge Trail No. 140. The majority of the OHV and 4 x 4 vehicle use occurs on road 4161 from the top of Whites Gulch, north to Wagner Gulch from late spring to late fall. Some OHV use occurs in the spring and early summer and there is very little snowmobiling.

Hiking use is moderate. Most use occurs along the Camas Ridge Trail and Trail 118, by recreationists attracted to the Boulder Baldy and Camas Lakes areas. Firewood gathering occurs mainly along the Long Gulch and Atlanta Creek Roads.

1. RECREATION OPPORTUNITY SPECTRUM

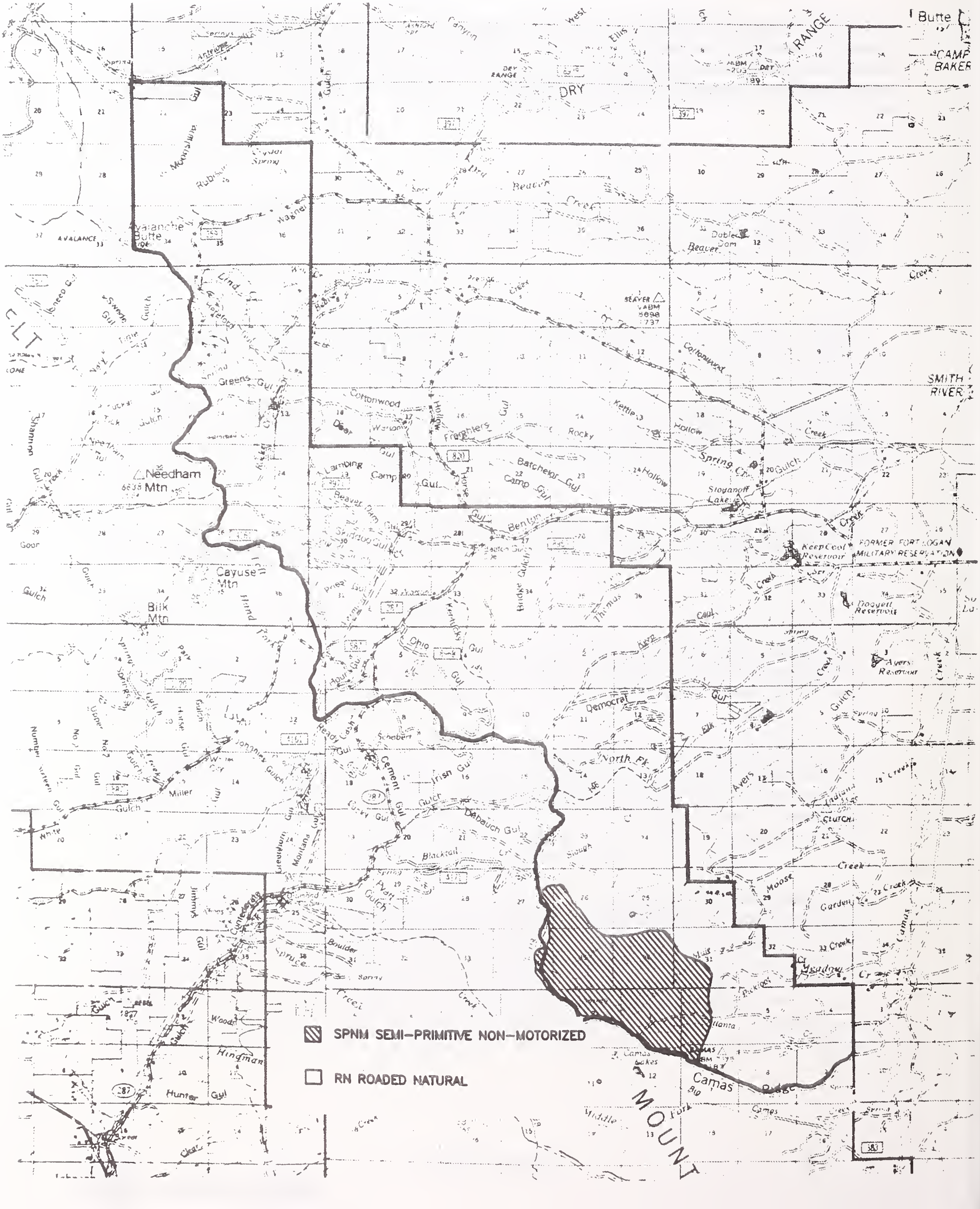
The Recreation Opportunity Spectrum (ROS) offers a framework for understanding the relationship between recreation settings and a desired set of experiences. The Spectrum has been divided into six major classes: Urban, Rural, Roaded Natural, Semi-Primitive Motorized, Semi-Primitive Non-Motorized and Primitive.

Approximately 24,300 acres of the Implementation Area is included within Roaded Natural. Within the Roaded Natural area, a variety of motorized and non-motorized activities occur that are related to existing roads. These activities usually occur adjacent to streams and include viewing scenery, wildlife and historic sites, hunting, and gathering forest products. The following section describing roads and trails identifies the locations and types of uses associated with them. Visitors can expect to encounter other vehicles or users, with increased likelihood during hunting season.

Approximately 2,700 acres of the area is Semi-Primitive Non-Motorized. The Semi-Primitive Non-Motorized area is located in the southwest corner of the Implementation Area incorporating the head of Atlanta, Mule, Moose and Slough Creeks. It is bounded by Camas Ridge to the south and the Meagher/Broadwater County line to the west. The Semi-Primitive Non-Motorized environment is natural appearing and interactions between users is typically low. Evidence of other users includes two track jeep trails created through use along Camas Ridge and along the ridge to the north of Atlanta Creek. A sign or two can be seen along the Camas Ridge and Atlanta Creek jeep roads, as well as evidence of an irrigation ditch and a small diversion in the Atlanta and Pickfoot Creek drainages.

The desired condition for ROS classes within the Implementation Area as identified in the Big Belts Landscape Analysis is the same as the current condition. ROS class boundaries may be altered slightly after the Belts transportation plan is completed. The Recreation Opportunity Spectrum is further explained in the Project File. Map III-8 displays the various ROS settings of the Implementation Area.

MAP III-8 RECREATION OPPORTUNITY SPECTRUM



D. TRANSPORTATION SYSTEM

1. Roads

The Implementation Area is accessible by an extensive road and trail network. Most of the early roads were developed primarily for mining and its associated activities. Many of these roads were first used in the 1800's as wagon roads, and then improved in the early 1900's to accommodate motorized traffic. Roads developed to accommodate timber harvest were primarily used for hauling mining timbers and cord wood until the 1950's. Since then, roads have been built in the area to access sawtimber for commercial timber sales and for mineral exploration. Previously low-standard roads were improved and new roads were constructed to remove harvested timber.

All of the roads in the area are single-lane, low standard roads, and are a mixture of private, county and Forest Service development roads. Generally the alignment of these roads is suitable only for low speed traffic. Most of the roads are surfaced with native material and become impassible when wet.

Major access to the area is provided by State Highway 284 from the west and by Meagher County Road 360 from the east. The Benton Gulch-Confederate Gulch Road provides the only east-west route across the Implementation Area.

Most of the Implementation Area is roaded, except for most of the area that is in the proposed Camas Creek Wilderness. The private land immediately to the east of the area is generally roaded and many of these private roads access the National Forest. Road No. 4161 exists on the western boundary of the Implementation Area from the head of Blacktail Creek to the northern edge of the area.

Several collector roads that provide access to the area include:

Atlanta Creek Road No. 575: This road provides the access to the southern portion of the Implementation Area. The road starts at the Camas Creek Road, which is a Meagher County road, and ends at Camas Ridge. This is a single-lane road with turnouts and is suitable for passenger cars in the dry months. The first 4.4 miles of the road are surfaced with aggregate and the remaining 5.5 miles are surfaced with native materials. The road is serviceable in its current condition. The road is closed to motorized use from October 15 to May 15.

Confederate Gulch Road No. 287: This road provides access to the central portion of the Implementation Area. The road connects Broadwater County Road No. 287 with the Meagher County Benton Gulch Road. This road provides the only east-west motorized route through the Implementation Area. The 2.5 miles of the road under Forest Service jurisdiction are single-lane, with turnouts. The road has a native material surface and is serviceable in its present condition. The road is open to motorized vehicles yearlong.

Confederate Road to Wagner Gulch Road No. 4161: This road provides vehicle access along the Belt Mountain divide from Whites Gulch (S. 6, T10N, R3E) north to Wagner Gulch, where it terminates in Section 2, T11N, R2E. An un-named ridge road extends from Whites Gulch south along the Belt Divide to where it becomes trail 118. Both roads were created through use. It provides access for wood cutters, hunters and other four wheel drive and OHVs. It is very rough and steep in places with poor drainage. A local recreation coalition has submitted a proposal that identifies this road as an important low standard road, providing loop travel use in the area.

Whites Gulch Road No. 587: This road provides access to the central portion of the area. It connects the Whites Gulch Road with the Confederate Gulch Road. The road has a native surface, and there are several sections of the road that require reconstruction to be fully serviceable. The road is open

to motorized vehicles yearlong. Portions of this road were damaged by a severe rain that occurred in Spring, 1993. Portions of the Whites Gulch road that goes from the Implementation Area to State Highway 284 was also destroyed.

Wagner Gulch Road No. 259: This road provides access to the northern portion of the Implementation Area. It begins at Meagher County Road No. 360 and ends at the head of Spring Creek. The 7.7 miles of road is single-lane, with turnouts. The road has a native surface that becomes impassible in wet weather. However, it is serviceable when the road is dry or frozen. If the road is to be used in wet weather some aggregate surfacing is needed. The road is open to motorized vehicles yearlong.

2. Trails

There are five trails in the Implementation Area: the Belt Crest Trail No. 118, Camas Ridge Trail No. 140, Pickfoot Trail No. 141, Needham Trail No. 236 and Kentucky Gulch Trail No. 145. Use on these trails is light to moderate except during the hunting season.

Belt Crest Trail No. 118: The trail begins at the head of Blacktail Creek and follows the Continental Divide south to Boulder/Baldy Mountain. The trail is suitable for hiker/horse use, and use occurs mainly in the summer and during hunting season. The trail is part of the Belts Crest Trail system. The trail is closed to motorized vehicles from October 15 to May 15 from the District boundary to Blacktail Road No. 4171. This portion of the trail is in the Camas Creek Rare II Roadless Area.

Camas Trail No. 140: *T*his trail begins at the end of the Atlanta Creek Road No. 575. It includes nine miles of jeep trail until it terminates at the junction of Trail No. 118 near Boulder/Baldy Mountain. The area is restricted to motorized travel from October 15 to May 15. It is used in the summer to access Camas Lakes and used by bow hunters in the fall. Most of the use is by vehicle. Part of this trail is within the proposed wilderness area and all of it is in the Camas Creek Rare II Roadless Area.

Pickfoot Trail No. 141: This is a two mile long trail that intersects the Camas Trail, No. 140, near Boulder/Baldy Mountain. The trailhead is located off of the Atlanta Creek Road, where it is signed. The trail is closed to motorized travel from October 15 to May 15. Most of the trail is within the proposed wilderness area and all of it is in the Camas Creek Rare II Roadless Area.

Kentucky Gulch Trail No. 145: This trail starts at the Confederate Gulch Road, at the mouth of Kentucky Gulch, and ends at the Belt Crest Divide. This trail is in good condition. It is suitable for hiker/horse use, and is used primarily during hunting season. The trail is closed to motorized travel from October 15 to June 30. This trail is located within the Irish Gulch Rare II Roadless Area.

Needham Trail No. 236/Road 259-A1: For many years this was a trail and then in the late 1970's or early 1980's it was converted into a road. The Round Grove Ranch controls access from Wagner Gulch. Either a ROW or construction of a trail above the Wagner Gulch Road on Forest land is needed to access this road. The newly constructed access trail could become part of the Belt Crest Trail or used strictly to access Forest Service lands. This road/trail is in the Cayuse Mountain Rare II Roadless Area.

E. ROADLESS AREAS

Inventoried roadless areas are undeveloped Federal land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use. They generally exclude narrow projecting tentacles or fingers unless they meet the criteria for "Roadless Islands".

Roadless islands are roadless areas that are surrounded by permanent waters or that are markedly distinguished from surrounding lands by topographical or ecological features such as precipices, canyons, thickets, or swamps.

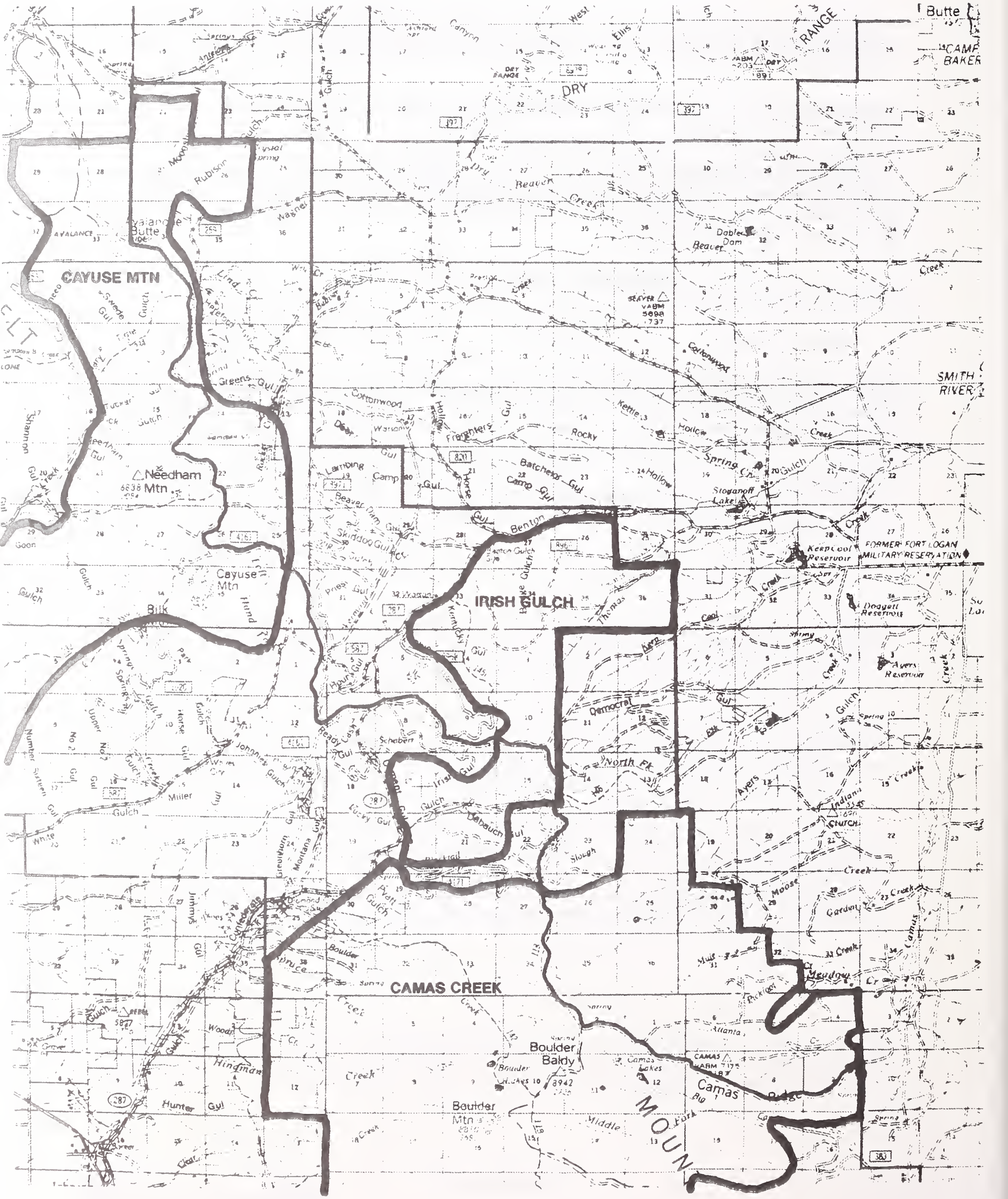
An improved road is a constructed or maintained vehicle way for the use of highway-type vehicles having more than two wheels.

The Wagner/Atlanta Vegetation Implementation Area includes portions of three RARE II Roadless Areas. These areas from north to south are; Cayuse Mountain (X1615), Irish Gulch (1621) and Camas Creek (1616) as shown on Map III-9. These inventoried roadless areas comprise approximately 66 percent of the Implementation Area.

TABLE III-21 ROADLESS AREA ACRES

ROADLESS AREA	TOTAL ACRES	ACRES IN I.A.	TOTAL MI. ROADS IN I.A.
Cayuse	19,353	4,466	13. 6 (Federal)
Irish Gulch	7,787	5,040	6.2
Camas Creek	28,832	8,586	16

MAP III-9 INVENTORIED ROADLESS AREAS



1.Cayuse Mountain (X1615)

The Cayuse Roadless Area extends from the northern edge of the Implementation Area to Cayuse Mountain. The area is 12 miles long and varies in width from two to five miles.

There are approximately 13.6 miles of roads within the portion of the Roadless Area within the Implementation Area, 9.8 miles are on Forest and 3.8 miles are on private land. Forest Road 4161 extends north and south along the eastern half of the Area following the Belt Mountain Divide from Avalanche Mountain to Cayuse Mountain. This is a low standard road that provides access into this area for four-wheel drive vehicles and motorized all-terrain vehicles (ATVs). Steep slopes limit cross-country travel but the high elevation ridges are often gentle enough to permit motorized travel.

The Area's elevation ranges from 4,800 feet at the Forest boundary to 7,700 feet at Avalanche Butte, the most prominent feature in this area. Recreation use is primarily big game hunting, grouse hunting, sightseeing and mining. Much of this use is vehicle oriented but hunting on foot is still popular. The heaviest use occurs along Forest Road 4161. Most of the north and east facing slopes are forested and the south and west facing slopes contain large openings of rough fescue and bluebunch wheatgrass. The dominate tree species is Douglas-fir.

The Cayuse Mountain Roadless Area has not been included in any recent Montana wilderness legislation. It may be included in the proposed Northern Rockies Ecosystem Protection Act but maps of this proposal are not available at this time.

Wilderness Attributes

a. Natural Integrity

The Cayuse Mountain Roadless Area contains a total of 19,353 acres. Approximately 4,466 acres are within the Implementation Area; 3,630 of these acres are National Forest land and 836 acres are on private land. The majority of the private land is owned by the Round Grove Ranch Company, Inc. and is managed for livestock grazing. In 1992, the land owner harvested approximately two million board feet of timber through selective harvest over about 450 acres to increase livestock forage production. This occurred within and adjacent to the northeast portion of the roadless area (T12N, R2E, Sections 25, 27 and 35). On the National Forest, approximately 70 acres of the Cayuse Roadless Area (T11N, R2E, Sections 10 and 11) that is within the Implementation Area were clearcut harvested 15 to 20 years ago.

b. Apparent Naturalness

Excluding the areas mentioned in the preceding paragraph, the remaining areas has some appearance of being undisturbed by human activities, aside from range allotment fences, some low standard roads, and one old cabin located in Beaver Creek.

c. Remoteness/Solitude/Primitive Recreation Opportunity

The Cayuse Mountain Roadless Area is located about 25 miles east of Helena and 25 miles north of Townsend, Montana. Forest road No. 359 boarders the area's western boundary and Forest roads No. 425 and No. 4161 forms the eastern boundary. They provide numerous access points. The southern portion of the area, from Tucker Gulch south, is within a yearlong area closure to motorized vehicles while the northern portion has no travel restrictions. The northern part of this roadless area receives a moderate amount of off road vehicle (OHV) use.

This Area's narrow geographic shape and roading limit the opportunity for remoteness and solitude. During the big game hunting season, it is difficult to avoid contact with others. The sights and sounds from adjacent developments are difficult to avoid. Except for hunting, the area does not offer any outstanding opportunities for non-motorized recreation.

d. Unique Features

Special features include Avalanche Butte at 7701 feet elevation and Needham and Cayuse Mountains that are both over 6800 feet elevation. None of these features are within the project area, though Avalanche Butte is along the western boundary. However, the area does not particularly offer any outstanding opportunities for non-motorized recreation, except for big game hunting.

e. Manageability/Boundaries

The long established vehicle use of the low standard roads in the northern half of the Cayuse Roadless Area is a major distraction from a wilderness environment in this area. The area closure in the south half has been effective in eliminating motorized vehicle activity. Much of the boundary is in manageable locations. Along the eastern side, in the area of Spring Creek and south to the head of Long Gulch, the boundary is located at mid slope and not along logical topographic features. Incursions into this Roadless Area have left 18,833 acres unaffected.

2. Irish Gulch (1621)

The Irish Gulch Roadless Area is the fourth smallest roadless area within the Helena National Forest. It is six miles long and varies from four and a half miles to less than one mile wide.

The area contains 6.2 miles of roads, all on the National Forest. A network of unmaintained four-wheel drive roads cross the area, where steep slopes and tree cover have not prohibited travel. Low standard roads approaching from the east are controlled by private landowners and public access is generally denied. Access from public roads is less than two miles from any part of the area.

The Big Belt Mountain Divide crosses the area for approximately one mile. The Divide and the steep slopes above Confederate Gulch and Benton Gulch are the most prominent features within the area. Elevations range from 5,200 feet at the Forest boundary to 6,800 feet along the Belt Mountain Divide. Much of the area is forested with Douglas-fir. There are several large natural opens of rough fescue and bluebunch wheatgrass throughout most of the south and west facing slopes.

The Irish Gulch Roadless Area has not been included in any recent Montana Wilderness legislation. It is suspected that this roadless area is included in the proposed Northern Rockies Ecosystem Protection Act, but maps are not available at this time.

Wilderness Attributes

a. Natural Integrity

The Irish Gulch Roadless Area is a total of 7,787 acres in size. Approximately 5,040 acres (4,640 acres of National Forest land and 400 acres of private land) are within the Implementation Area. The private land is owned by either Big Sky Timber or Clifton and Helen Coleman. Big Sky has recently logged their land that is within and adjacent to the Irish Gulch Roadless Area and the Colemans utilize their land as part of a cattle grazing operation. Also, the private land that is outside and adjacent to the roadless area's eastern boundary has been clearcut. Existing incursions within the Irish Gulch Roadless Area have affected 320 acres.

b. Apparent Naturalness

Considering the past logging and the presence of range allotment improvements, mining activity and associated structures, low standard roads and the area's small, narrow size the Irish Gulch Roadless Area has much evidence of human activities within and adjacent to it.

c. Remoteness/Solitude/Primitive Recreation Opportunity

This roadless area is located 30 miles east of Helena and 27 miles north of Townsend. Forest roads 287, 8968 and 4171 form the northern, western and southern boundaries respectively. The eastern boundary is defined by adjacent private land. There are numerous motorized and non-motorized access routes into this roadless area. The northern half of the area is closed to motorized vehicles from October 15 to June 30.

The Irish Gulch Roadless Area has a narrow geographic shape and is quite small which limits the opportunity for remoteness and solitude. Near the mid point, the roadless area is less than 1 mile wide. The area receives a moderate amount of motorized use. Summer use occurs, however, the greatest use occurs during the big game hunting season. Road noise from Benton Gulch penetrates much of the area. By avoiding the established roads, one can enjoy some primitive recreation opportunities. During the big game hunting season it is difficult to avoid contact with others. Except for hunting, the area does not offer any outstanding opportunities for non-motorized recreation.

d. Unique Features

There are no special features within this roadless area.

e. Manageability/Boundaries

The north, west and southern boundaries are adjacent to roads and the eastern boundary follows fenced section lines crossing drainages and ridges. They are in manageable locations. Adjustments to follow topographic features or buffer the area from development would not leave a sizable acreage for wilderness consideration. Incursions on private land within the Irish Gulch Roadless Area have left 7,467 acres unaffected.

3. Camas Creek (1616)

This roadless area is located at the southern end of the Implementation Area. The Area is about 7 miles long, north to south and 9 miles wide, east to west.

There are about 16 miles of roads (12 miles on National Forest and 4 miles on private land) within the Implementation Area. The Camas Ridge Road forms the southern boundary of the Implementation Area, but cuts through the center of the Roadless Area, and extends to within 1/2 mile of Camas Lakes.

Elevations ranges from 5,000 feet at the Forest Boundary to 8,900 feet at the peak of Boulder Baldy. The topography is quite steep to the ridge tops, and then becomes relatively gentle and easy to follow towards the Forest Boundary. The area is more timbered then the other two roadless areas. Most of the area is forested with lodgepole pine, Douglas-fir and, to a lesser extent, spruce. Dominate understory vegetation consists of rough fescue and Idaho fescue within park grasslands interspersed on south slopes.

Most of the Camas Creek Roadless Area has been included in recent Montana Wilderness legislation. Approximately 4,845 acres of the roadless area that is within the Implementation Area has been

included in this most recent wilderness legislation. It is expected that this roadless area is included in the proposed Northern Rockies Ecosystem Protection Act but maps of this proposal are not available at this time.

Wilderness Attributes

a. Natural Integrity

The Camas Creek Roadless Area contains 28,832 acres. About 8,586 acres (6,960 acres are National Forest and 1,624 acres of private land) are within the Implementation Area. There are several parcels of private land within this roadless area. They include land owned by Hidden Hollow Ranch Company, Lester L. Fields; and Rodger and Rose Rader. Only the land owned by the Rader's is within the Implementation Area and it is located on the northeast side of the roadless area. Approximately 420 acres of logging has occurred within this area on the Rader land. The Forest Service built the Atlanta Creek Road No. 575 in the mid 1980's within the eastern half of the roadless area. This road goes from Mule Creek south to Camas Ridge and is about five miles long.

The center of the roadless area appears unchanged from development. Elsewhere, impacts from human activity include unimproved two-wheeled track roads; water pipelines from Atlanta and Pickfoot Creeks that go onto adjacent private land to the east; a reservoir on Pickfoot Creek; water ditches on Pickfoot, Atlanta and Camas Creeks; a snow course with instruments at the head of Pickfoot Creek; fences for livestock management; and, several spring developments.

Additionally, in the mid 1980's, the Forest Service constructed roads in two other locations south of Blacktail Creek into the Camas Creek Roadless Area, but outside of the Implementation Area. These roads are 1.8 miles long but no timber harvesting occurred. Also, in 1990, just inside the western boundary of this roadless area, the Forest Service constructed 1.2 miles of road to the Stove Camp trailhead. Affected acres from these incursions total 2,335 acres.

b. Apparent Naturalness

Excluding the areas mentioned in the preceding paragraph, the remaining area has an appearance of being undisturbed by human activity. Fire exclusion, however, has modified the natural appearance of the vegetation in terms of species composition and structure as more thoroughly explained in the Big Belts Landscape Analysis.

c. Remoteness/Solitude/Primitive Recreation Opportunity

The Camas Creek Roadless Area is approximately 28 miles east of Helena and 15 miles from Townsend, Montana. The Forest Service boundary forms most of the west and east boundaries of this roadless area. The northern boundary is at midslope south of the Confederate Gulch and Blacktail Creek Roads and the southern boundary is north of Little Camas Creek partially following the Big Belt Mountain divide and side drainages. The central portion of the Camas Creek Roadless Area that includes the Boulder Lakes, Camas Lakes and Boulder Mountain is within a yearlong motorized vehicle area closure. Almost all of the rest of the roadless area is closed to motorized vehicles from October 15 to May 15 for wildlife security and non-motorized vehicle management. These area closures are effective in controlling motorized vehicle use.

Topography and vegetative screening provide opportunities for solitude throughout most of the Camas Creek Roadless Area. However, opportunities for solitude are greatest in the Boulder Baldy area and diminish near the periphery of the area. Other than hunting season, recreationists can generally avoid contacts with others. Recreation activities include hunting, hiking, horseback riding and camping. The Belt Divide and Camas Ridge Trails are the main avenues for these uses.

d. Unique Features

This roadless area possesses many special features. The area's high mountain peaks are located in a heavily glaciated geologic landform that is fairly unique to the mountain range. The steep granitic rock formations stand out as attractions to many backcountry enthusiasts. Boulder Lakes and Camas Lakes are popular destination points that are in the glacial cirques on Boulder Baldy and Boulder Mountain. The lakes maintain a cutthroat and brook trout fishery that is popular with anglers. Sight-seeing is also very common.

e. Manageability/Boundaries

The north and south boundaries would be difficult to locate and manage as they are at midslope and not along topographic features. The east and west boundaries generally follow the Forest boundary but they do not follow topographic features. Given the fact that the Big Belt Mountains are a relatively narrow mountain range running north and south with the main divide going through the middle of the Camas Creek Roadless Area, it would be very difficult to locate the east and west boundaries along well defined topographic features. Existing incursions on lands within this roadless area have resulted in 26,497 acres that are unaffected.

The analysis of roadless lands, documented in Appendix C of the FEIS for the Helena Forest Plan, describes each roadless area, the resources and values considered, the range of alternative land uses studied, and the effects of management under each alternative. As a result of that analysis some roadless areas were recommended for inclusion in the National Wilderness Preservation System and others were assigned various non-wilderness prescriptions. Refer to pages C/224-226, C/236-238 and C/274-276 of Appendices A,B,C to the Helena National Forest Plan Environmental Impact Statement for additional information regarding the roadless areas.

F. THE VISUAL RESOURCE AND SCENERY MANAGEMENT

1. Management

The system used by the Forest Service to evaluate inherent scenic quality and establish goals for desired scenic condition is *The Visual Management System, Chapter 1, Volume 2, National Forest Landscape Management* (USDA, 1974).

A goal related to Visual Resources listed in the Helena Forest Plan (1986) is to provide forest visitors with visually appealing scenery. Appendix B to the Forest Plan assigned visual sensitivity levels to viewing points and corridors where maintenance of visual quality was of greatest concern. Site specific guidelines for altering the landscape, or visual quality objectives (VQO's) are also listed in Appendix B of the Forest Plan.

The Implementation Area is potentially visible from the following **sensitivity level 1** viewing areas listed in Appendix B of the Forest Plan:

- U.S. Highway 12
- Gates of the Mountains Wilderness Area
- Duck Creek Road 139
- State Highway 89 (Scenic Byway, Lewis & Clark NF)

The VQO for foreground views (to 1/4 mile) from these viewing areas is **retention**. The VQO for midground and background viewing is **partial retention.** All other viewing locations are considered

as Sensitivity Level 3. Views from these areas are assigned a specific VQO by Management Area in the Forest Plan. Map III-10 displays the Visual Quality Objectives for the Implementation Area.

The following recreation travel routes also offer views of the Implementation Area, however they are not included as sensitive viewing areas in the Forest Plan.

- County Road 360 (main access to the Smith River)
- Confederate Gulch Road 287 (alternate access to the Smith River) from the crest of the Big Belt Mountains east to the junction with County Road 360.
- Belt Crest Trail 118

A portion of the Camas Creek Roadless Area is designated as an R-1 Management Area in the Forest plan, which carries a Retention VQO.

2. Existing Condition

The Implementation Area lies on the east side of the Big Belt Mountains up to the crest. The area forms the backdrop for travelers, boaters and picnickers in the Smith River Valley along Highway 12, on County Road 360 to the Smith River Access, and for the town of White Sulphur Springs.

The Big Belt Mountains fall within the Broad Valley Rockies Landscape Character Type. The area in general has moderate visual appeal, and meets Variety Class B (Common) criteria.

North of White's Gulch the mountain crest broadens, with saddles that lay generally around 6,500 feet. The south and west aspects are consistently dry and often rocky, but are punctuated with ponderosa pine, Douglas-fir, and juniper interspersed with parklands and grasslands. North and east exposures are cooler and moister, and supports some dense Douglas-fir and/or lodgepole pine stands as well as more parklike stands. Limber pine and occasionally subalpine fir inhabit the highest slopes, but the broad crest of the range tends to be parkland with some expansive, grassy openings.

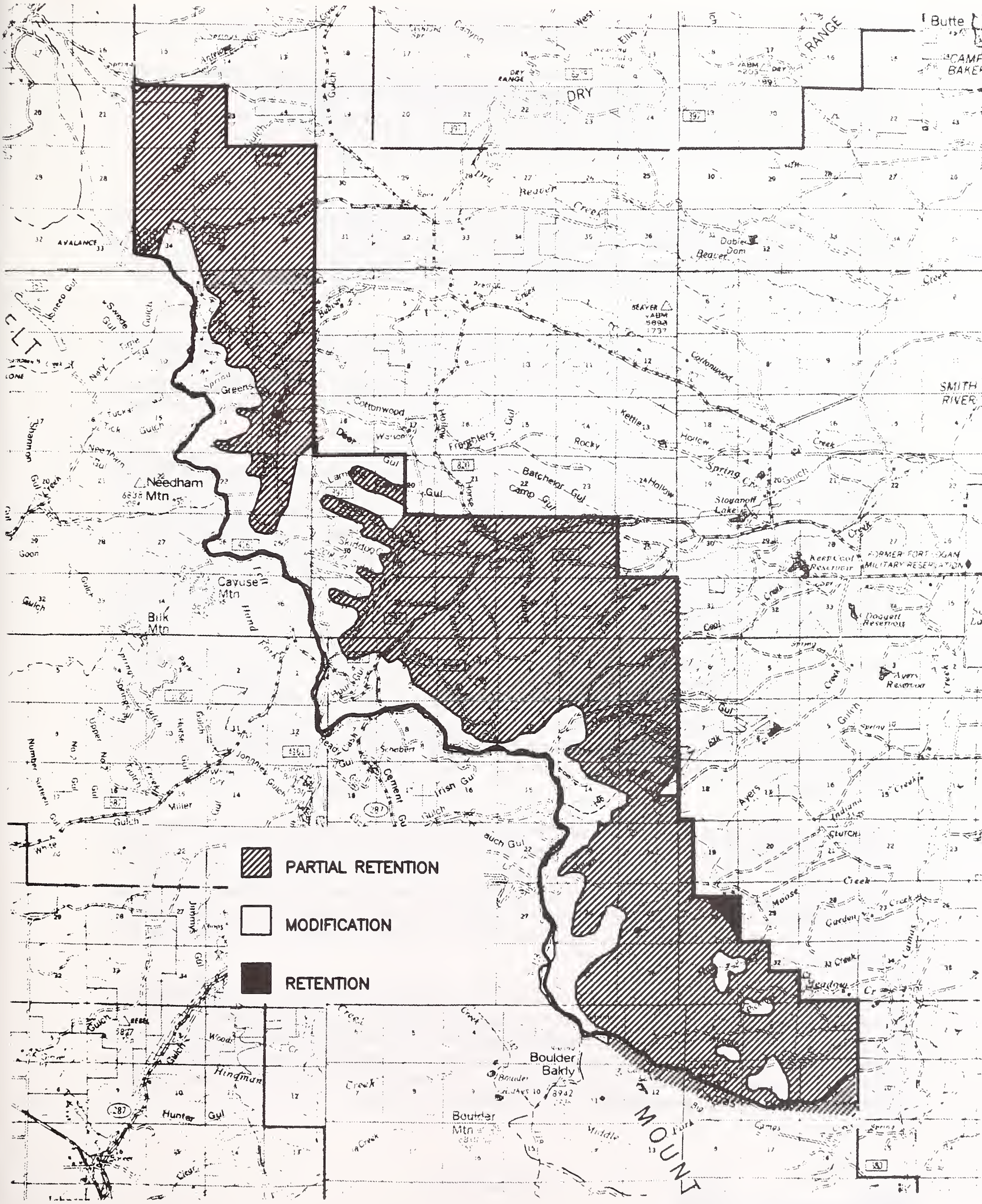
South of White's Gulch, open Douglas-fir stands or Douglas-fir parklands occupy the lowest elevations in the Implementation Area. Middle elevations support Douglas-fir or lodgepole pine, and higher elevations support subalpine fir and whitebark pine.

Timber harvest has occurred on approximately 1400 acres throughout the Implementation Area. Existing harvest units visible from sensitive viewing areas at background viewing distances generally meet the VQO of Partial Retention and Modification. The high diversity of the landscape "absorbs" management activities at this viewing distance, and unit shapes somewhat mimic natural openings found in the characteristic landscape.

Visual impacts from grazing are evident from many roads which follow riparian areas. Loss of structural diversity in vegetation is apparent, and in many riparian areas the vegetation is cropped very close to the ground. These visual impacts are especially evident along Benton, Ohio, Wagner, Thomas and Confederate Gulches.

Visual impacts from mining are evident along Benton and Thomas Gulches. Change from natural-occurring form and line are evident in the "trenching out" of the stream bottom and the displacement of gravel. While the impacts are evident, vegetation has re-established on some gravel mounds.

MAP III-10 VISUAL QUALITY OBJECTIVES



G. HERITAGE RESOURCES AND SECTION 106 INVENTORIES

Evidence of human occupation in the Implementation Area spans more than 10,000 years of history and prehistory. Since the inception of the Helena National Forest Cultural Resource Program in 1975 various Sec. 106 (NHPA) inventories in the Implementation Area have led to the discovery of six cultural resource sites. Four of the sites (24 ME 70, 73, and 168 and 24 BW 151) relate to prehistoric aboriginal use of the Implementation Area and two others (24 ME 171 and 277) relate to historic era mining activities.

Native Americans inhabited the Implementation Area portion of the Big Belts throughout the past 8,000 years. Their past lifestyles, values, technology and settlement patterns are reflected in the existing condition of the mountain range today. The influence of Europeans began with trappers. Miners and ranchers also impacted the area with road building, timber harvesting, townsite development, mining and domestic grazing.

Prehistoric cultural site 24 BW 151 is indicative of the prehistoric land use pattern established by George C. Knight in his Forest Service publication, (*Overview: Ecological and Cultural Prehistory*; 1989). Knight's study consisted of an analysis of human land use patterns and migration routes as reflected in known cultural resource sites throughout both the Helena and Deerlodge National Forests.

Site 24 BW 151, located in a saddle at the crest of the Big Belt Mountain Range, is probably the remnants of a summertime campsite where a small prehistoric hunter/gatherer band stopped to kill game and/or collect plant foods while in transit from the river bottoms. The site is typical of the model established by Knight and, indeed, one should expect to find other prehistoric occupation sites along the crest of the Big Belt Mountain Range throughout the entire Implementation Area. In addition, prehistoric sites that relate to the pursuit of big game, vision questing, fishing, plant collecting, and habitation along various drainages, ridgetops, natural springs, open meadows and alpine parks throughout the area can be expected.

At the onset of white settler contact in the greater White Sulphur Springs area circa 1864 the land now included in the Implementation Area witnessed a new form of human adaptation. The earliest white settlers along the eastern flanks of the Big Belt Mountain Range were principally placer miners searching for gold although homesteaders, ranchers, woodcutters, and other "support" industries quickly followed the prospectors. The establishment in 1864 of Whites City and Diamond City, just west of the Implementation Area boundaries, represent two of the earliest white settlements in Montana Territory.

Historic era cultural resource sites located within the Implementation Area will most likely be related to the various surface structures and landscape features associated with placer, hydraulic, and lode mining activities. Cultural resource property types associated with the mining industry will range from framed surface structures like log cabins, mills, ore bins, and bunkhouses, to landscape features like prospect pits, trenches, adits, gravel/tailings piles, and diversion ditches. There is evidence within the Implementation Area of a lode mine along Beaver Creek (24 ME 277) that features two adits, an isolated log cabin, and wooden ore cart track.

Unlike prehistoric sites where certain physiographic features lend themselves to human habitation historic era mining sites are difficult to tie to geography alone. The pursuit of the gold vein could have led prospectors anywhere along a continuum between river valley bottoms, to steep side slopes, to mountain ridgetops. Hence, one can potentially find evidence of historic era mining sites anywhere within the Implementation Area. Other historic era surface features will include homesteads, barns, ranches, dairies, fences, woodcutters' cabins, and dams/reservoirs.

H. SPECIAL USES

There are four types of activities that occur in the Implementation Area that are permitted as Special Uses. These include: outfitter/guide, pastures, water transmission and storage facilities and snow survey sites. These are described as follows to the extent that they relate to the proposed activities.

1. Outfitter/Guide

There is only one permitted outfitter/guide operating in the Implementation Area. The permittee conducts day-use big game hunting trips during general rifle season. The permitted area is National Forest lands in the upper reaches of Slough, Elk and Moose Creeks. Use is approximately 70 visitor days during that period. The permittee has an associated camp on adjacent private land.

2. Pastures

There are three pastures under special use permit within the Implementation Area.

a. T12N, R2E, Sections 1,2,11,12

This special use pasture basically surrounds the private homestead lands in the Beaver Creek-Hereford Gulch area. The pasture is a result of fences constructed prior to boundary surveys. The permit includes 623 acres and provides for a total of 85 AUMs. The grazing period is June 1 to October 15.

b. T11N, R3E, Section 28, 32

This special use pasture includes 39 acres in two separate pieces. It provides 19 AUMs between June 1 - October 15. District personnel are currently working with the permittee to remove one of the parcels under permit. The portion of Forest lands under permit is to accommodate terrain conditions and eliminate cattleguards on FS road.

c. T11N. R2E, Sections 1 and 2

This pasture is also associated with the private homestead lands in the Hereford Gulch area. It includes 50 acres and provides 2 AUMs between June 1 and October 15.

3. Water Transmission and Storage Facilities

a. Reservoir dam, reservoir and ditches, T9N, R4E, Sections 4,5 and 6; T10N, R4E, Sections 32 and 33.

The dam and its associated reservoir are located at the Forest Boundary on Pickfoot Creek in Section 32. Earthen ditches run from Atlanta Creek and Pickfoot Creek to the storage reservoir. The permittee holds the appropriate water rights.

b. Pipeline T9N, R4E, Sections 4,5 and 6

The pipeline runs along the ridge between Atlanta and Pickfoot Creeks, originating at a spring at the head of Pickfoot Creek in Section 6. The line is 2 1/4 miles long and is buried 1 foot deep with 3 tanks at the surface for livestock watering.

4. Snow Survey Sites

There are two SNOTEL snow survey sites located in the Implementation Area. These sites provide precipitation information which is used by the Soil Conservation Service to provide a State-wide assessment of precipitation conditions.

a. Boulder Mountain Site - T9N, R3E, Section 1 (SW1/4)

This site was installed in 1963. It includes a small structure, snow pillows and other instrumentation and it is surrounded by fence. The site permit is for 1.2 acres as well as 400 feet of buffer surrounding the site.

b. Pickfoot Creek site - T10N, R4E, Section 31 (SE1/4)

This site was installed in 1978. It includes instrumentation, a structure and fence, similar to the Boulder Mountain site. It is located on the ridge between Mule Creek and Pickfoot Creek.

I. LANDS

Lands have been identified for acquisition and disposal based on priorities identified in the Big Belts Landscape Analysis (Draft, May, 1993) and the Helena National Forest Plan. The priorities for acquisition include lands assessed as having high value for wildlife, recreation and watershed, unique habitats (including riparian areas), potential for subdivision, and access to public land. Priorities for disposal include isolated, small tracts resulting from past patenting and lands that are difficult to manage due to inaccessibility and/or intermingled ownership. Lands located within the Implementation Area that have been identified for acquisition include:

TABLE III-22 LANDS IDENTIFIED FOR ACQUISITION

LOCATION	REASON
T10N, R3E, Sections 25, 30	Unique habitat, winter range
T10N, R3E, Sections 1,2,11,12,13,14	Big game winter range
T10N, R3E, Section 5 (NW 1/4)	Riparian
T11N, R3E, Sections 29,32 (partial)	Riparian, Access
T11N, R3E, Section 27,	Riparian, Winter range
T12N, R2E, Section 35,27	Access, unique habitat

Because they are difficult to manage, various tracts in Beaver Creek have been identified for disposal.

Right of way easements through private land providing access to National Forest lands include;
- Wagner Gulch Road No. 259
- Benton Gulch Road No. 287
- Atlanta Creek Road No. 575

Roads that physically access National Forest land that do not have right of way easements are found in Beaver Creek, Rubison Gulch, Cottonwood Gulch, Vermont Creek, Benton Gulch, Thomas Creek,

Keep Cool/Democrat Creeks, Elk Creek, Moose Creek, Mule Creek, Pickfoot/Meadow Creek and Atlanta Creek. These access roads can be used only by landowner permission.

J. MINERAL ACTIVITY

Mineral activity in the Implementation Area has occurred on and off since the 1860's when placer gold discoveries were first made. More recent activity has been on a smaller scale than occurred in the past. A limited level of placer mining activity can be expected to continue into the future as long as gold retains its recent values. A summary of mining activity in the Implementation Area on a stream by stream basis follows;

1. Placer Mining

a. Beaver Creek

Most activity occurred by the 1950's, using sluices. Recent activity includes an operation in Section 24 with less than one acre of disturbance. The existing condition includes:

- Overburden piles (scattered).
- Excavation in/adjacent to streambanks occurs in a couple of distinct spots; totals approximately 500 feet.
- Two acres of poorly revegetated disturbance features (piles, reclaimed sites).
- Future activity is expected at a small scale (< 1 acre disturbance per year).

b. Vermont Gulch

There has been continuous activity from 1975 to present. The bottom of Vermont Gulch, as well as some isolated excavation areas, have been mined and reclaimed, totalling, approximately 20 acres. Currently there are approximately two acres of ongoing operation that is unreclaimed. Future mining projects (of up to five acres in size) can be expected.

c. Benton Gulch

Benton Gulch had extensive placer mining during the late 1860s and has experienced sporadic activity ever since. Approximately three miles of the drainage, including the creek, was exhumed during its extensive mining period. Currently, overburden piles placed adjacent to the creek are unstable and eroding. Much of the original fine material in the streambed has been washed away, leaving stream gravels with water percolating into the subsurface.

Currently benches adjacent to the stream have been the source of most of the more recent activity which is relatively small scale (less than one acre of disturbance per year). These benches have unreclaimed piles of material and unfilled excavations. Total disturbed drainage area on National Forest lands in Benton Gulch is estimated to be 40 acres. Future small scale (<1 acre project areas) testing and mining projects can be expected.

d. Thomas Creek

Extensive placer mining from the 1860's through 1941 resulted in exhumation of nearly two miles of the drainage. Material removed from the drainage has left an unnatural gradient and altered the surface water flow. Currently there is no surface flow in much of Thomas Creek. Most of the altered drainage bottom is private land, however, piles of material and unfilled excavations can be found on adjacent National Forest lands. An operation was conducted and reclaimed in Section 36 in 1991. This activity occurred on the bench adjacent to the stream. Total disturbance was approximately three acres. Future proposals for testing and mining can be expected (up to five acres in size)

e. Elk Creek

A relatively small amount of placer mining occurred in Elk Creek, likely before the 1930s. Activity occurred on the floodplain adjacent to the creek. Remnants of settling ponds are evident but are well vegetated and stable. A small (< 1 acre) placer project occurred on the northwest side of the creek in the mid-1980s and several test holes were excavated and reclaimed in 1992. There is the possibility of future activity in Section 24 in this drainage.

f. Slough Creek

A minor amount of hand-scale prospecting and exploration has occurred in the lower portion of this drainage.

g. Atlanta Creek

Extensive placer mining occurred on the bench on the north side of Atlanta Creek during the early period (prior to 1930). The result is excavated "tunnels" that run perpendicular to the stream but do not affect the stream (Section 4). Hand placed rock along these areas is considered an exceptional cultural resource. Ditches were dug on the bench between the north and south forks of Atlanta Creek to funnel water to the placer diggings. Additional placer disturbance occurred between approximately 1950-1980 and resulted in numerous unfilled excavations and rock and overburden piles, primarily along the South Fork in Sections 4 and 9.

Recent activity includes an operation on the south fork that has conducted excavation in the south bank and on a bench adjacent to a tributary of the south fork. A settling pond is constructed adjacent to the stream and is approximately 50 feet long. Total disturbance related to past and recent placer mining is about ten acres. Most of this disturbed area did not alter the stream channel, has been reclaimed and is vegetatively stabilized, with the exception of the recent activity. There is currently approximately 1.5 acres of unreclaimed area where the ongoing activity is located.

2. Leasable Minerals

Leasable minerals include oil and gas and other resources that tend to occur in extensive "layered" deposits. The Implementation Area includes geology that is somewhat favorable to the development of oil and gas deposits. The Big Belt mountains were the focus of leasing activity in the late 1970s to early 1980s. Seismograph operations were conducted and a dry hole was drilled east of the Implementation Area near Fort Logan during that period. There has been no exploration activity within or near the Implementation Area for approximately 10 years. Future activity is dependent upon the leasing decision that will be made in the Record of Decision for Oil and Gas Leasing Environmental Impact Statement (Draft, December, 1993). The preferred alternative identifies most of the lands within the Implementation Area as available for leasing with controlled surface use stipulations.

3. Mineral Materials

Geologic materials that can be used for engineering and building purposes, in general, are referred to as mineral materials. They are sold to the public based upon application and environmental analysis. Mineral materials have not been inventoried for the Implementation Area. Several sites have been used in the past for road surfacing purposes and there is potential for future use of materials in this way. In general, materials found on National Forest land are also more readily available to the public closer to town, thus, it is most likely that any development of these materials will be for Forest Service use. Sites developed for road use are usually adjacent to existing roads and are small in size (less than 5 acres).

K. RANGE USES

There are currently 45 livestock allotments within the Big Belts Landscape Analysis area. Thirty-three allotments are on the Townsend Ranger District and twelve are on the Helena Ranger District. A total of seven livestock allotments are within the Implementation Area.

Major changes in livestock grazing within the Implementation Area over the last 50 years have been the conversion of sheep allotments to cattle allotments. As the sheep industry declined, some of the smaller allotments that were suitable for sheep grazing only became vacant. Other allotments with some range suitable for cattle were absorbed into adjacent allotments and converted to use by cattle.

Allotments within the Implementation Area currently provide 5,327 head months of production. Each allotment within the Implementation Area is operating under an approved allotment management plan. However, none of the current plans have Forest Plan standards in them. Forest Plan standards have been applied in annual grazing plans each year since 1991 and put into any grazing permits that have been renewed. This will be done until allotment management plans are revised and implemented in 1995.

Grassland/shrubland conditions on allotments, overall, are generally good. However, allotments in the southern portion of the Implementation Area have shown declining conditions in available forage. In addition, there has been an increase in introduced and weedy species and an overall reduction in grassland/shrubland areas due to colonization by coniferous species.

Riparian areas within allotments are generally in a degraded condition. This is due to past heavy livestock use and nearly all drainages in the Belts have been placer mined and do not function in the same way they did historically. Upper drainage riparian areas are in good condition as they have not been subject to much human caused disturbance.

Each allotment has had some kind of structural development program. This includes spring developments and fence construction. Condition of these improvements is generally fair to poor. Many developments are old and have not been replaced. An assessment of the condition of each improvement is ongoing and will be evaluated for removal or reconstruction during the revision of allotment management plans.

Map III-11 displays grazing allotments within the Implementation Area. A total of seven allotments within the Implementation Area are shown as follows:

TABLE III-23 RANGE ALLOTMENTS

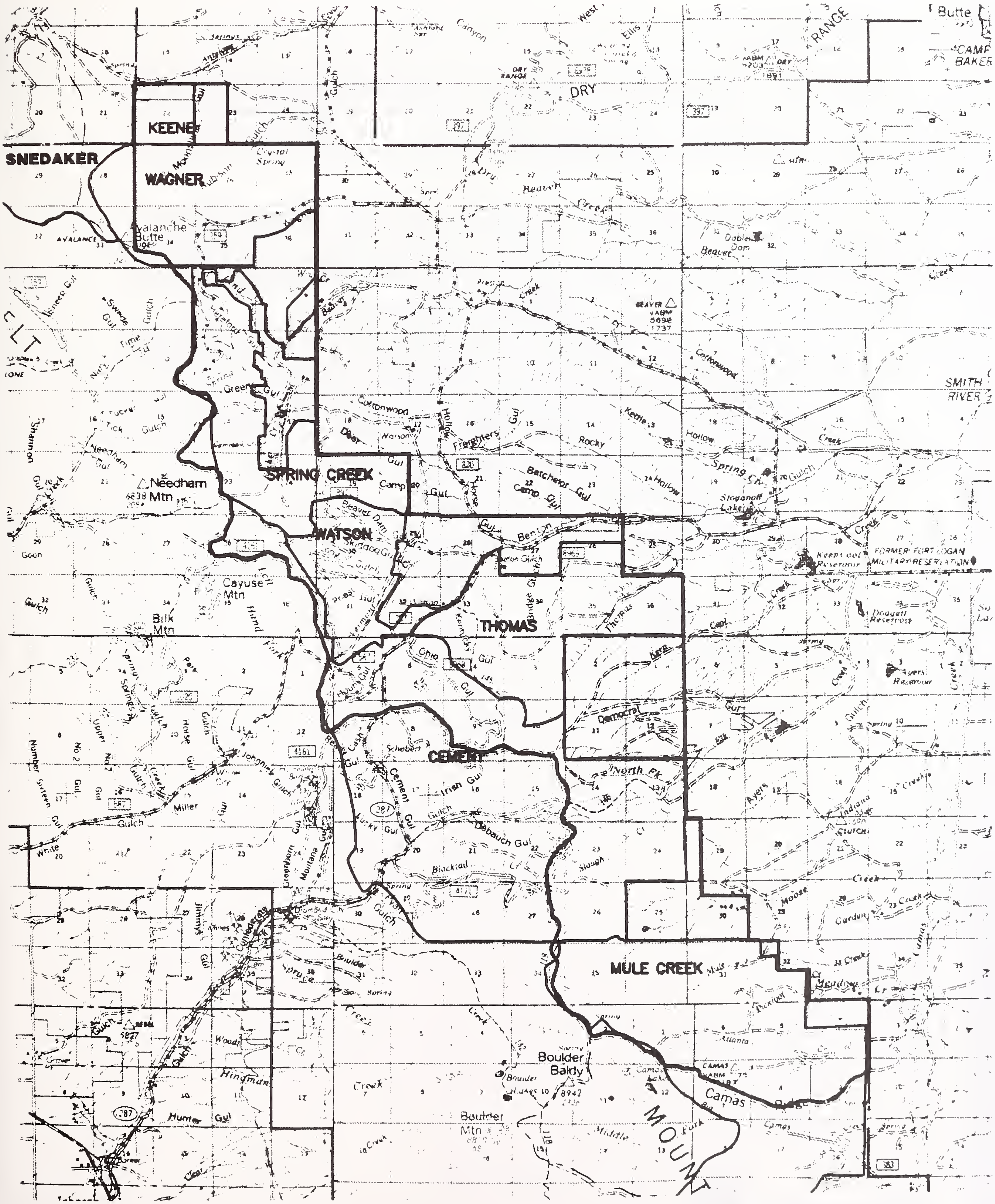
ALLOTMENT	RAMIS No.*	LIVESTOCK (pair)	SEASON OF USE	GRAZING SYSTEM	AMP DATE
Thomas	112	142 cattle	7/1-10/15	3P-deferred	1968
Cement	113	267 cattle	7/1-9/30	2P-deferred	1968
Mule Creek	114	347 cattle	6/16-10/15	5P-rest	1977
Spring Creek	135	133 cattle	6/10-10/15	3P-deferred	1974
Watson	136	81 cattle	7/1-10/15	2P-deferred	1970
Wagner	140	1200 sheep	6/21-8/31	season long	1950

ALLOTMENT	RAMIS No.*	LIVESTOCK (pair)	SEASON OF USE	GRAZING SYSTEM	AMP DATE
Keene	143	60 cattle	6/15-11/15	2P-deferred	None

*RAMIS Rangeland Allotment Management Information System

Vegetation treatment unit proposals occur on all allotments. Structural improvements on each allotment include spring developments, pipelines and fences. Many of the spring developments will be scheduled for reconstruction in the revised allotment management plan. Fencelines are generally in good condition. Areas that are proposed for treatment are generally not considered primary range for livestock.

MAP III-11 GRAZING ALLOTMENTS



L. FIRE SUPPRESSION

Wildfires within the Implementation Area have been suppressed since about the turn of the century by the Forest Service. Records indicate that since 1937 suppression action was taken on 58 fires. Thirty-five of these fires burned less than one acre each. Forty-five of the 58 fires were caused by lightning. Abandoned campfires are the next largest category of fire causes in the Implementation Area. The largest fire on record in the Implementation Area since 1937 was 595 acres and was person caused.

The Forest Plan allows appropriate suppression response to wildfires within the Implementation Area to vary between *control, containment,* or *confinement*. All wildfires within the Implementation Area have been suppressed since 1937 using the control strategy. Fire suppression response time within the Implementation Area is approximately 25 minutes by helicopter. The Helena National Forest has been using helicopters for initial attack response since 1983.

The lack of frequent, low intensity wildfire has resulted in a build up of ladder fuels on high energy aspects on Douglas-fir sites. These ladder fuels have dramatically increased since historical times, resulting in an increased risk of stand replacing fires, especially in Douglas-fir stands.

Table III-24 displays the costs of suppressing wildfires within the Implementation Area.

TABLE III-24 WILDFIRE SUPPRESSION COSTS

FIRE SIZE IN ACRES	COST PER ACRE
0-.9	$4,260
1-29	$3,043
30-99	$1,826
100-999	$487
1,000-10,000	$183

CHAPTER IV–

ENVIRONMENTAL CONSEQUENCES

CHAPTER IV - ENVIRONMENTAL CONSEQUENCES

CHANGES BETWEEN DRAFT AND FINAL

Several changes were made in this chapter as of result of either requests for clarification or because of additional findings since release of the DEIS. Following is a summary of the changes.

-Effects to water resources have been rewritten to better acknowledge the risks associated with high intensity wildfires and to distinguish between short term and long term effects and recovery rates associated with AMP revisions.

-Sections dealing with forest vegetation have been modified to improve clarity and understanding. No substantive changes have been made.

-The wildlife section has been expanded to provide additional information regarding management indicator species, songbirds, and the current status of the grey wolf.

INTRODUCTION

The purpose of this chapter is to disclose the environmental consequences of implementing the Proposed Action and its alternatives. Each alternative would affect the environment in different ways. The environmental effects of the alternatives are presented and form the scientific and analytic basis for the comparison of the Proposed Action and its alternatives disclosed in Chapter II.

Using the resource inventory of the existing environment and description of the proposed action, each resource specialist identified the types of consequences (effects or impacts) that each alternative could have on the resources. Impacts can be beneficial or adverse, and result from the action, either directly or indirectly. Impacts can be permanent or temporary. In the case of this analysis, long term impacts are defined as those that would substantially remain for 15 years or longer. Short term impacts are defined as changes to the environment that would generally revert to pre-existing conditions within 15 years of the termination of activity. Impacts can vary from no change, or only slightly discernible changes, to a full modification or elimination of the environmental condition.

The scope of the analysis includes three types of effects:

- **Direct Effects** are caused by the proposed action or alternatives and occur at the same time and place.

- **Indirect Effects** are caused by the proposed action or alternatives and are later in time or farther in distance but are still reasonably foreseeable. Indirect effects on resources were analyzed for all of the alternatives. Direct and indirect effects are considered together in the analysis and not specifically identified or disclosed separately.

- **Cumulative Effects** results from incremental impacts of the proposed action when added to other past, present, and reasonably foreseeable future actions regardless of what person or agency (Federal or non-Federal) undertakes those actions.

The anticipated timeframe during which the decision made relative to this EIS is expected to be in effect is 5-8 years. In order to make an informed decision, the document must also provide information about the effect other past, current, and reasonably foreseeable activities have had and will have on potentially affected resources. The potentially affected area is different for each resource. The effects of all relevant activities,

regardless of land ownership, are considered in the analysis. Chapter III described the spatial and temporal scope of the affected areas.

Past, Present and Future Activities

Past and on-going activities within and adjacent to the Implementation Area include fire suppression, road construction, timber harvest, livestock grazing, placer and hard-rock mining, hunting, and motorized and nonmotorized recreation. Activities which have taken place on private land adjacent to the Implementation Area include most of these same activities, together with other normal activities related to private land development.

Future actions most likely to occur within the Implementation Area include revisions of Allotment Management Plans and revisions to travel management. Routine and traditional operations and maintenance activities such as fire suppression and road and trail maintenance will continue. No other reasonably foreseeable actions have been identified.

The effects of past and present activities have helped to create the existing environment of the Implementation Area which was described in Chapter III. Future actions may cause effects that are additive to the projected effects related to this action. Chapter IV then assesses the effects of each alternative and their interaction with effects of other reasonably foreseeable activities.

Mitigation

Once the impacts were identified for each alternative, each resource specialist determined measures that would appropriately mitigate the impacts. The Forest Plan EIS disclosed the types of impacts that could occur as a result of management actions. This chapter incorporates Chapter IV of the Forest Plan EIS and indicates any significant differences between Forest-wide impacts and mitigation measures and those developed specifically for this proposal and its alternatives. Although all resources relevant to the implementation area are addressed, the emphasis is on the effects relative to the key issues. The effects remaining after mitigation were summarized and compared for each alternative in Chapter II.

The decisions based upon this effects analysis are limited to the implementation area. The analysis for most resources was limited to the decision area, but several, including air and water quality looked at larger areas.

As defined by 40 CFR 1508.20, mitigation includes:

- **Avoiding the impact** altogether by not taking a certain action or parts of an action;
- **Minimizing the impact** by limiting the degree or magnitude of the action and its implementation;
- **Rectifying the impact** by repairing rehabilitating, or restoring the affected environment;
- **Reducing or eliminating the impact** over time by preservation and maintenance operations during the life of the action;
- **Compensating for the impact** by replacing or providing substitute resources or environments.

Forest Plan standards employ the measures described above. Thus, this chapter is a site-specific tie between effects identified in Chapter IV of the Forest Plan EIS and Forest Plan standards for mitigating those effects. In addition to the standards of the Forest Plan, mitigation is provided for specific situations in Chapter II of this EIS. For example, all newly constructed roads would be closed after project completion.

CONSEQUENCES BY TOPIC

In this section, the effects on the physical, biological and social-economic environments are discussed.

1. SOILS

A. Introduction

Effects to soils are described in relation to current and planned soil disturbing activities (or the lack thereof) related to the alternatives under consideration and their impacts on nutrient availability, cycling and influence on plant available moisture. ELUs and LTAs were used as the analysis area for this study. The analysis is based on a review of current inventory data, photo interpretation, field visits, relevant literature and personal communication with District personnel by the Forest Soil Scientist. The environmental consequences analysis assumes that applicable Best Management Practices (BMPs) listed in Appendix C would be implemented as specified.

Silvicultural treatments and site preparation activities and roads are the primary variables influencing soil disturbance. Specifically these activities include the yarding method, the nature of site preparation required, the amount and number of trees to be removed, and the skill and understanding of the equipment operator. Soil disturbance occurs when topsoils are compacted or removed, severely muddied, and/or severely altered by burning. These effects are associated with skid trails and landing areas used to access and manage the treatment units. Additional detrimental disturbance can occur in conjunction with site preparation for slash abatement and regeneration purposes, or as a result of the cumulative effect of such treatments and yarding disturbance.

Soil Disturbance Ratings

In order to assess the relative potential impact of each alternative incidental to the forested vegetation treatments, a "detrimental disturbance index" is used. This index is a weighted average detrimental disturbance level for each alternative based on the percentages of each of the projected forest treatment classes described below.

The following harvest/site preparation scenario groupings are based on estimated detrimental soil disturbance ranges as described in FSH 2509.18, R-1 Supplement No. 2509.18-94-1. These groups serve as a disturbance rating and are used to compare alternative effects. The estimated effects are based on personal experience of the Forest Soil Scientist and are comparable to soil disturbance monitoring results in similar areas. For analysis purposes it is assumed all activities would take place in the absence of protective snow cover or frozen ground conditions. In all cases adequate large and fine woody debris would be retained. However, burning produces charcoal and ash which have been linked with maintenance of adequate micorrhizzal activity.

> **Group 1: cable yard/underburn-jackpot burn or broadcast burn or whole tree yard or lop and scatter:** detrimental disturbance as a result of these treatments would likely be extremely low, ranging from less than one percent to as high as two or three percent. Soil disturbance would be limited mineral soil exposure and possible displacement confined mainly to the yarding corridor areas and would be extremely incidental elsewhere in the units. Yarding corridor disturbance would be less where protective ground cover such as litter and duff and woody debris is sufficient. Yarding over snow or requiring full log suspension may be required on some high energy slopes where ground cover is inadequate and the surface soil is loose and easily displaced. Small severely burned areas which may adversely affect soil properties may occur where fuel concentrations occur. Under prescribed burning prescriptions these areas should be mostly incidental and of minor extent.

Group 2: ground based harvest system/machine trample and dozer pile: this treatment would likely result in 13 to 18 percent detrimental soil disturbance due to the cumulative impact of yarding equipment traffic and dozer passes during trampling and piling operations. Soils in the major skid trails and landings would be compacted and displaced to varying degrees, primarily due to yarding. Soil disturbance elsewhere in the units would range from superficial soil movement beneficial for planting or seedling establishment to localized detrimental soil displacement, compaction and deposition. Approximately 75 percent of the site preparation would be accomplished through machine trampling of slash. Compaction and displacement should be minimal as a result of this phase of the operation because the equipment operates over a bed of slash. As a result detrimental soil disturbance would likely be at the low end of the disturbance range. Also the silvicultural guidelines emphasize minimizing detrimental disturbance . A high percentage of the total mineral soil exposure would likely be associated with skid trails, landings and areas of localized displacement and deposition.

Group 3: ground based harvest system/underburn-jackpot burn or broadcast burn or lop and scatter-dozer trample: these treatments would likely result in 8 to 12 percent detrimental disturbance, mainly a combination of compaction and displacement associated with the more used skid trails and landing areas. An underburn and jackpot burn combination or broadcast burn will benefit nutrient cycling, assuming sufficient woody debris and duff are retained. Where the lop and scatter and dozer trample option applies, approximately 25 percent of the site preparation would be accomplished through machine trampling of slash. Compaction and displacement should be minimal as a result of the this phase of the operation because the equipment operates over a bed of slash. Also, the silvicultural guidelines emphasize minimizing detrimental disturbance. Lop and scatter of slash results in no additional soil disturbance.

Group 4: helicopter yard/underburn-jackpot burn or broadcast burn: these treatments would likely result in negligible (less than 1 percent) detrimental soil disturbance. An incidental amount of fire damaged soil could result from burning woody debris concentrations. Generally, existing roads or previously disturbed areas would be used as landings.

Group 5: helicopter yard/dozer trample-dozer pile: this treatment would likely result in three to seven percent detrimental disturbance from incidental displacement and compaction concentrated in dozer piled areas. No soil disturbance would be associated with the helicopter yarding. Approximately 75 percent of the site preparation would be accomplished through machine trampling of slash. Compaction and displacement should be minimal as a result of the this phase of the operation because the equipment operates over a bed of slash. Also the silvicultural guidelines emphasize minimizing detrimental disturbance.

Group 6: timber burn: this treatment would result in little detrimental disturbance. An incidental amount of fire damaged soil could result from burning woody debris concentrations.

Group 7: grass burn: this treatment would result in no detrimental disturbance.

General Mitigation Measures

The extent of undesirable disturbances would be controlled through the implementation of Best Management Practices such as reasonably spaced skid trails, retention of woody debris, and by minimizing the amount of mineral soil exposure prescribed for tree regeneration purposes. Also limited piling of slash concentrations, "one pass" piling techniques and careful slash trampling techniques will be used when possible to reduce the potential for detrimental disturbance. Excavator piling results in a similar reduction in detrimental disturbance. In addition, it allows precise placement and retention of woody debris pieces and a high level of control over the nature and distribution of soil disturbance for regeneration purposes.

The projected extent of detrimental disturbance due to ground based yarding on well drained soils would be reduced by 75 to 90 percent or more should the yarding operations take place under winter conditions. Adverse impacts of tractor piling would be reduced should it be accomplished over frozen ground. A combination of winter yarding and excavator piling/regeneration scarification during the mid to late summer would reduce detrimental disturbance to the units planned for ground based equipment operations.

B. Effects Common to All Action Alternatives

Vegetation treatments for all alternatives are in ecological landscape units 2 and 4. In localized areas of disturbance soil productivity would be lowered and plant species adapted to more disturbed soil conditions would be favored. These disturbances are considered within the Agency's current standards for soil protection and although they result from actions that would not occur naturally. The management actions and resulting disturbances are considered compatible with long term maintenance of ecosystem functions.

In every alternative, the ground based treatments (groups 2 and 3) result in obvious detrimental disturbance, mostly restricted to the more used skid trails and landings. Some detrimental disturbance may result from piling where debris is cleared from the soil surface and multiple machine passes are involved. Limited, well located skid trails and less impactive site preparation requirements are included in all alternatives and would confine and lessen impacts. Yarding over snow or frozen ground would substantially mitigate the detrimental disturbance associated with skid trails and landings. The effectiveness of ripping skid trails and landings as a rehabilitation measure would be limited by high subsurface rock contents.

With the exception of Alternative B, low to moderate intensity, short duration fires will discourage cattle and elk use concentrations by ensuring high quality forage over increased areas. This will allow for appropriate maintenance of a range of grassland or shrubland desired plant communities which would produce adequate above and below ground biomass to replenish or increase soil organic matter.

C. Direct and Indirect Effects by Alternative

1. Alternative A

This alternative would treat approximately 3,400 acres of forest and use prescribed fire to treat around 2,900 acres of grassland.

Silvicultural Treatments

The projected forest treatments include soil disturbance groups 1 (29%), 2 (15%), 3 (24%) and 6 (32%). This alternative moves effectively toward soil related desired conditions as defined in the Landscape Analysis. The main limitation of this alternative is that very few existing roads are closed and stabilized. This foregoes an opportunity to further reduce sedimentation and concentration of road drainage as compared to actively used road prisms.

Detrimental soil disturbance would generally be at a moderate level when compared to the other alternatives. Natural soil layers and other physical properties would be maintained in over 95 percent of the treated forest acres and 100 percent of the grassland acres burned. Most productivity loss would be confined to designated skid trails and landings in the forested units treated with ground based equipment. Such impact could be greatly reduced by yarding over snow and/or frozen ground.

Nearly half of the warm, dry forest would be treated mainly to restore forest structure and understory vegetation. As a result plant community conditions over a high percentage of the treated areas would be conducive to historic nutrient cycling processes, including fire, within approximately 5 to 15 years. This alternative treats nearly half of the grasslands. Prescribed fire would maintain desired, healthy grass dominated plant communities (those historically maintained by fire with vigorous root systems) which are essential

to sustained high levels of soil biological activity, soil nutrient cycling and organic matter turnover. It treats slightly less (14 percent) of the cool, moist forest than the other alternatives but, at least contributes toward a reasonable distribution of successional stages over time in this landscape component. The individual treatment units proposed in this alternative tend to be somewhat interconnected within specific portions of the Implementation Area thus increasing their effectiveness at the landscape level. The potential for large mostly lethal fires which pose a higher risk of fire damage to soil and channel instability (particularly in shale portion of ELU 4 which is sensitive to increased peak flows) would be reduced should this alternative be implemented. At a minimum the severity of soil related wildfire effects would be less in treated areas. Over half (54 percent) of the forested units proposed would benefit from the use of prescribed fire.

Roads

Alternative A would require an intermediate amount (17.3 miles) of new road construction compared to the other alternatives. These new roads would be returned to contour following treatments. Although this alternative would result in a short term alteration of hydrologic function and soil conditions due to road construction and reconstruction, the effect in terms of sedimentation and disruption of local hydrologic function would be minimal. It closes only a minor amount of existing roads (1.84 miles) - the least of all the alternatives. The levels of sedimentation and occurrence of road drainage problems would be highly dependent on the effectiveness of road maintenance. Stream channels would likely remain vulnerable to periodic downcutting and sedimentation (primarily related to in-channel erosion and culvert failures) in the shale portion of ELU 4 above historic levels.

2. Alternative B

This alternative proposes no actions be taken. No additional vegetation treatments or roading activities would occur at this time. The actual soil disturbance in the untreated areas between fires would be restricted mainly to disturbance related to tree blowdown, burrowing animals, and minor disturbance from larger animals. Fire exclusion has changed the role of fire in the decomposition of organic matter and recycling of nutrients and has changed the effect future wildfires would have on the landscape. On drier, warmer habitat types historically subject to periodic low to moderate intensity, mostly nonlethal fires, stand structure and understory conditions (fuel and litter accumulations) have become conducive to stand replacing fires. As a result of these mostly lethal fires the opportunity to restore open mature Douglas-fir and whitebark pine forests (often with old growth qualities) would be foregone for at least 100 to 200 years or more. This would result in a further disruption of historic fire dependent nutrient cycling. Localized soil erosion is probable where bare soil is exposed following removal of litter and woody debris which has accumulated over time usually at the expense of understory vegetation. Also on the cooler, moister sites the potential for stand replacing (mostly lethal) fires would continue to increase where a combination of lethal and nonlethal fires historically influenced the site. The potential for severely burned areas would increase due to continued fuel buildups on the ground (high fuel concentrations over a more widespread and continuous area than would have occurred historically). Fuel continuity would continue to increase on the landscape as a whole which would encourage more extensive fires. Failure to reinstitute fire dependent vigorous bunchgrass plant communities would result in continued reduced levels of soil biological activity (as a result of less nutrient availability and slower organic matter incorporation) as well as more limited rooting (less underground biomass production). Increased peak flows due to reduced forest canopy and transpiration following extensive wildfire would likely result in channel downcutting in the shale portion of ELU 4 to greater degree than would have commonly occurred historically. This would cause a reduction in riparian (wetted) area. This effect would likely be more extreme if poor riparian vegetation and channel instability problems in the implementation area due to existing ungulate grazing and road drainage problems continue to exist. This alternative would result in a disruption of soil nutrient cycling and availability on the different components whether or not they are affected by wildfire.

Approximately 2,976 acres of the general 16,700 acre planning area has been subject to disturbance in excess of natural levels due to past roading and harvest.

3. Alternative C

This alternative would treat approximately 2,900 acres of forest and use prescribed fire to treat around 2,500 acres of grassland.

Silvicultural Treatments

This alternative moves toward the soil related desired conditions defined in the Landscape Analysis but would attempt to restore historic forest structure and understory plant communities in a relatively limited amount of the warm, dry forest. It would forego an opportunity to treat additional such areas to set the stage for historic nutrient cycling and organic matter turnover needed to sustain healthy Douglas-fir and limber pine forests (often with old growth characteristics).

Detrimental soil disturbance would be low compared to the other alternatives. Natural soil layers and other physical properties would be maintained in over 97 percent of the treated forest acres and 100 percent of the grassland acres burned. Most productivity loss would be confined to designated skid trails and landings in the forested units treated with ground based equipment. Such impact could be greatly reduced by yarding over snow and/or frozen ground.

Less than one third (28 percent) of the warm, dry forest would be treated mainly to restore historic forest structure and understory vegetation. As a result plant community conditions over a high percentage of the treated area would be conducive to historic nutrient cycling processes, including mostly nonlethal fire, within approximately 5 to 15 years. This alternative treats nearly half (47 percent) of the grasslands. The grassland units treated with prescribed fire would maintain desired, healthy plant communities (those historically maintained by fire with vigorous root systems) which are essential to sustained high levels of below ground biological activity, soil nutrient cycling and organic matter turnover. It treats 17 percent of the cool, moist forest which at least contributes toward a reasonable distribution of successional stages over time in this landscape components. The individual treatment units proposed in this alternative tend to be somewhat connected and concentrated within specific portions of the Implementation Area. This increases their effectiveness at the landscape level in that large enough areas move toward the desired condition in terms of fire regimes, evapotranspiration, local hillslope hydrology and other processes. The potential for mostly lethal fires which were much larger than occurred historically and that would pose a higher risk of fire damage to soil and channel instability (particularly in shale portion of ELU 4 which is sensitive to increased peak flows), and disrupt historic plant communities including those with old growth characteristics. The potential for such fires would be reduced should this alternative be implemented. At a minimum the severity of soil related wildfire effects would be less in the treated areas. Nearly two-thirds of the forested units proposed would benefit from prescribed fire.

Roads

Alternative C would require a relatively low amount (9.0 miles) of new roads compared all of the other action alternatives, except F. Some new roads would be returned to contour following treatments. Others would be stabilized using other methods which would retain the road prism. Although this alternative would result in a short term alteration of hydrologic function and soil conditions due to limited road construction and reconstruction, minimal sedimentation and disruption of local hydrologic function would occur.

It closes and stabilizes the greatest amount of existing roads (25.0 miles). Stream channels would be less vulnerable to periodic downcutting and sedimentation (primarily related to in-channel erosion and culvert failures) in the shale portion of ELU 4 due to better runoff dispersion from the road prisms. Road erosion and sedimentation would also decrease as a result of proposed revegetation and other stabilization of new and existing road prisms.

4. Alternative D

This alternative would treat approximately 3,000 acres of forest and use prescribed fire to treat around 1,400 acres of grassland.

Silvicultural Treatments

This alternative moves toward soil related desired conditions as defined in the Landscape Analysis to a lesser degree than the other alternatives except B. It would treat a very limited number of acres of grassland and warm, dry forest. Failure to reinstitute fire dependent vigorous bunchgrass plant communities and restore historic forest structure and understory vegetation on warm, dry aspects on sufficient acres would hamper nutrient cycling and availability over the large portion of the landscape not treated. Alternative D would also forego the opportunity to prevent the loss of existing and potential Douglas-fir and limber pine old growth for an extended period (100 to 200 years) due to wildfire. In addition, the treatment units are scattered throughout the Implementation Area and often often not interconnected. This would limit their ability to treat large enough areas to bring about effective change at a landscape level. Alternative D would require an extensive amount of new roads which would retain their prisms and would close and stabilize few existing roads. As a result, it would cause the most disruption of local surface and groundwater hydrology and commit the greatest amount of land to roads of all the action alternatives.

Detrimental soil disturbance would be high compared to the other alternatives. Natural soil layers and other physical properties would be maintained in over 89 percent of the treated forest acres and 100 percent of the grassland acres burned. Most productivity loss would be confined to designated skid trails and landings in the forested units treated with ground based equipment. Such impact could be greatly reduced by yarding over snow and/or frozen ground.

Thirty eight percent of the warm, dry forest would be treated mainly to restore historic forest structure and understory vegetation. As a result plant community conditions over a high percentage of the treated areas would be conducive to historic nutrient cycling processes, including mostly nonlethal fire, within approximately 5 to 15 years. This alternative treats the least grasslands (29 percent) of all the action alternatives except E. The grassland units treated with prescribed fire would maintain desired, healthy plant communities (those historically maintained by fire with vigorous root systems) which are essential to sustained high levels of below ground biological activity, soil nutrient cycling and organic matter turnover. It treats 20 percent of the cool, moist forest which at least contributes toward a reasonable distribution of successional stages in this landscape component. The individual treatment units proposed in Alternative D tend to be more scattered throughout the Implementation Area (often stand alone) than the other action alternatives decreasing their effectiveness at the landscape level. The potential for larger mostly lethal fires which pose a higher risk of fire damage to soil and channel instability (particularly in shale portion of ELU 4 which is sensitive to increased peak flows) may be reduced should this alternative be implemented but probably to a lesser degree than the other alternatives except B. At a minimum the severity of soil related wildfire effects would be reduced in the treated areas. About a sixth (16 percent) of the forested units proposed would benefit from prescribed fire - the least of all the action alternatives.

Roads

Alternative D would require by far the greatest amount (25.6 miles) of new road construction of the alternatives. A few new roads would be returned to contour following treatments. Other new roads would be stabilized using other methods which would retain the road prism. It closes only a small amount of existing roads (12.5 miles). Due to the large amount of new roads being introduced to the landscape and the retention of most of the existing road prisms this alternative would probably result in increased levels of sedimentation and road drainage problems. Stream channels would likely remain subject to periodic downcutting and sedimentation above historic levels (primarily related to in-channel erosion and culvert failures) in the shale

portion of ELU 4. This is related to the increased amount of concentrated runoff the streams would have to handle despite the implementation of road related best management practices (BMPs).

Approximately 15.0 miles of road would be reconstructed. Due to soil exposed during construction and reconstruction a minor short term increase in erosion is possible but entry into streams is unlikely as water would be directed away from stream channels into effective buffer zones.

Approximately 7.7 miles of existing road would be closed to all motorized use and stabilized by various means resulting in reduced erosion and sedimentation and less disruption of natural hydrology. Some existing roads in Beaver Creek and Long Gulch would be recontoured and revegetated which would facilitate recovery of natural hillslope drainage. Soil productivity would be partially recovered but would be hampered in that the topsoil is not available. The seasonal closure of Wagner Gulch Road would reduce road surface puddling problems due to poor bearing strength during wet weather.

5. Alternative E

This alternative would treat approximately 3,300 acres of forest and use prescribed fire to treat around 800 acres of grassland.

Silvicultural Treatments

This alternative would move toward soil related desired conditions as defined in the Landscape Analysis but would prescribe burn the least number of acres of grassland of all the action alternatives. Failure to reinstitute fire dependent vigorous bunchgrass plant communities would result in continued reduced levels of soil biological activity (as a result of less nutrient availability and slower organic matter incorporation) as well as more limited rooting (less underground biomass production). Alternative E foregoes the opportunity to treat vegetation in the designated roadless portion of the Implementation Area.

Detrimental soil disturbance would be moderately high compared to the other alternatives. Natural soil layers and other physical properties would be maintained in over 92 percent of the treated forest acres and 100 percent of the grassland acres burned. Most productivity loss would be confined to designated skid trails and landings in the forested units treated with ground based equipment. Such impact could be greatly reduced by yarding over snow and/or frozen ground.

Forty-one percent of the warm, dry forest would be treated mainly to restore historic forest structure and understory vegetation. As a result plant community conditions over a high percentage of the treated areas would be conducive to historic nutrient cycling processes, including mostly nonlethal fire, within approximately 5 to 15 years. This alternative treats the least amount of the grasslands (13 percent) of all the action alternatives. The grassland units treated with prescribed fire would maintain desired, healthy bunchgrass communities (those historically maintained by fire with vigorous root systems) which are essential to sustained high levels of below ground biological activity, soil nutrient cycling and organic matter incorporation. It treats 16 percent of the cool, moist forest which at least contributes toward a reasonable distribution of successional stages over time in this landscape component. The individual treatment units proposed in this alternative tend to be somewhat interconnected and concentrated within specific portions of the Implementation Area thus increasing their effectiveness at the landscape level. The potential for stand replacing (mostly lethal) fires which are much larger than occurred historically and that would pose a higher risk of fire damage to soil and channel instability (particularly in shale portion of ELU 4 which is sensitive to increased peak flows) would be reduced should this alternative be implemented. At a minimum the severity of soil related wildfire effects would be less in the treated areas. About a quarter of the forested units proposed would benefit from prescribed fire - the least of all the action alternatives except D.

Roads

Alternative E would require an intermediate amount (14.8 miles) of new roads compared to the other alternatives. Most new roads would be returned to contour following treatments. Although this alternative would result in a short term disruption of natural water movement and flows and result in soil disturbance due to road construction and reconstruction, the effect in terms of sedimentation and disruption of local hydrologic function would be minimal following recontouring and other stabilization. It closes and stabilizes a substantial amount of existing roads (14.5 miles). Stream channels would be less vulnerable to periodic downcutting and sedimentation (primarily related to in-channel erosion and culvert failures) in the shale portion of ELU 4 due to better runoff dispersion from the road prisms. Road erosion and sedimentation would also decrease as a result of revegetation and other stabilization of road prisms.

Most of the 14.8 miles of new roads constructed would be reclaimed and returned to contour following treatments. Exceptions include some roads constructed in the Slough and Beaver Creek areas which would be closed but the road prism retained. When topsoil is saved and placed back over a recontoured surface, vegetative recovery would occur faster and site productivity would be nearly fully restored. The local surface and subsurface hydrology would be disrupted to a much lesser degree than when the road prism is in place.

An estimated 14.5 miles of road would be reconstructed. Due to soil exposed during construction and reconstruction a minor short term increase in erosion is possible but entry into streams is unlikely as water would be directed away from stream channels into effective buffer zones.

About 14.0 miles of road will be closed and stabilized through various means, including recontouring in Long Gulch. Although recontouring would allow for partial recovery of inherent site potential it would be less effective because topsoil is not available. This can be partially mitigated through the use of mulch and fertilizer. Closure and stabilization of these roads would generally result in reduced erosion and sedimentation and less hydrologic disruption. The seasonal closure of Wagner Gulch Road would reduce road surface puddling problems due to poor bearing strength during wet weather.

6. Alternative F

This alternative would treat approximately 3,500 acres of forest and use prescribed fire to treat around 2,500 acres of grassland.

Silvicultural Treatments

This alternative moves toward soil related desired conditions as defined in the Landscape Analysis. It treats a sufficient amount of the forests and grasslands. It requires no additional roading and closes and stabilizes a substantial amount of existing roads.

Detrimental soil disturbance would be moderate compared to the other alternatives. Natural soil layers and other physical properties would be maintained in over 95 percent of the treated forest acres and 100 percent of the grassland acres. Most productivity loss would be confined to designated skid trails and landings in the forested units treated with ground based equipment. Such impact could be greatly reduced by yarding over snow and/or frozen ground.

Nearly half (49 percent) of the warm, dry forest within the Implementation Area would be treated mainly to restore historic forest structure and understory vegetation. As a result plant community conditions over a high percentage of the treated area would be conducive to historic nutrient cycling processes, including mostly nonlethal fire, within approximately 5 to 15 years. This alternative treats about 41 percent of the grasslands. Prescribed fire would maintain desired, healthy plant communities (those historically maintained by fire with vigorous root systems) which are essential to sustained high levels of below ground biological activity, soil nutrient cycling and organic matter incorporation. It treats 17 percent of the cool, moist forest and at least

contributes toward a reasonable distribution of successional stages over time within this landscape component. The individual treatment units proposed in this alternative tend to be somewhat interconnected and concentrated within specific portions of the Implementation Area thus increasing their effectiveness at the landscape level. The potential for mostly lethal stand replacing fires much larger than those which occurred historically would be reduced should this alternative be implemented. The risk of soil degradation and channel damage (particularly in shale portion of ELU 4 which is sensitive to increased peak flows) would be reduced should this alternative be implemented. At a minimum the severity of soil related wildfire effects in the treated areas would be less. Over half (56%) of the forested units proposed would benefit from prescribed fire.

Roads

Alternative F would require no new roads. No additional land would be committed to roads. No increase in sedimentation would occur except a possible slight increase for a year or two following the four miles of road reconstruction proposed. In some cases the reconstruction would reduce sedimentation and runoff concentrations by improving road drainage. In addition this alternative would close and stabilize 14.0 miles of existing road. Stream channels would be less subject to periodic downcutting and sedimentation (primarily related to in-channel erosion and culvert failures) in the shale portion of ELU 4 due to better runoff dispersion from the road prisms. Road erosion and sedimentation would also decrease as a result of revegetation and other stabilization of existing road prisms. This alternative would contribute positively toward restoration of historic watershed function and soil quality if implemented.

D. Cumulative Effects

All Action Alternatives

Assuming the required proper location and maintenance of major skid trails, landings, and spur roads, and the establishment of sufficient ground cover through revegetation within one or two seasons following harvest, erosion should be limited to scattered sheet and minor rill erosion of short duration and of minor consequence in terms of sediment generation and productivity loss. In regards to cumulative effects of harvest and site preparation activities, this would be the first major management entry into these treatment areas. Properly located major skid trails and landings would be used again for future entries to the degree practical. It is assumed that retention of sufficient woody debris in the units would lead to less heavy equipment impact and thus less detrimental soil disturbance during current and future stand entries. The adverse impacts on areas outside the dedicated transportation system (trails, landings, and roads) would be minimal except when tractor site preparation is prescribed (and in that situation the impacts can be reduced greatly as discussed above).

The cumulative effects of sedimentation and increased water yield (peak flows and timing of flows) will be greatly influenced by the condition of the riparian areas and channel stability. The concurrent effort to revise the Allotment Management Plans within the Implementation Area has a goal to improve riparian function, diversity and habitat values as required in the Forest Plan and by agency direction. Riparian areas will likely improve over the next 5 to 10 years and will be better able to absorb influxes of sediment and peak flows. Flows should also become more consistent and last longer in many drainages.

In addition, as a result of management improvements due to the upcoming allotment management plan revisions, the grasslands and their soil conditions should improve in the Implementation Area. This improvement in upland conditions in combination with the gradual restoration in riparian function over time will increase the resiliency of the watersheds within the area. The ability of the land to handle water will be enhanced and the effects of more extreme disturbances (large floods and fires, for example) would be tempered.

2. WATER RESOURCE

A. Introduction

The geographic scope of the analysis as well as the methodology and processes for analysis are displayed in Chapter III. The effects of management activities on the water resource may be short in duration or continue for many decades. Surface erosion from newly constructed roads drops rapidly within one to four years following construction. Following this period a lower degree of erosion will occur while roads are open for use. Hydrologic recovery, on the other hand, occurs more slowly ranging from 30 to 60 years depending on species and site conditions.

Best Management Practices

Compliance with State requirements for protection of Montana waters is required for all projects on National Forest System lands. The Forest Service is required to apply reasonable land, soil, and water conservation practices or specialized best management practices (BMPs). Best management practices are "reasonable" only if beneficial uses are protected. The project file contains a list of best management practices that have been identified for implementation and their estimated effectiveness in terms of protecting beneficial uses and meeting water quality objectives. This effectiveness rating comes from effectiveness monitoring done on other projects on the Forest that applied similar BMPs. Monitoring of implementation and effectiveness of BMPs will be found in the monitoring section.

In 1991, the Montana State Legislature passed the Streamside Management Zone (SMZ) Act (77-5-301 MCA) to regulate forest practices along streams. The SMZ best management practices specifically prohibit the following activities in the streamside management zones: broadcast burning; operation of wheeled or tracked vehicles (except on established roads); clearcutting; road construction (except for stream crossings); handling, storage, application or disposal of hazardous or toxic materials in a manner that pollutes streams; side-casting of road material into a stream or water course; deposition of slash in streams or other water bodies. All aspects of the SMZ Act will be adhered to.

B. Effects Common to All Action Alternatives

With the exception of Alternative F (Bridge Gulch), the direct and indirect effects of the alternative actions when taken alone will not result in any changes to stream channel morphology. Streams are expected to remain in a steady state equilibrium (stable form, about which seasonal and other short term fluctuations occur). Beneficial uses will be protected and State water quality standards will be met. The chemical, physical, and biological integrity of the streams in the Implementation Area will be protected. Stream channel similarity ratings will not change significantly in the short term. In the long term, stream channel similarity ratings are expected to move from low to moderate and from moderate to high as these areas approach the desired future condition.

There is risk for adverse effects to beneficial uses due to uncharacteristic stand replacing fires and associated flooding in all alternatives. This risk varies by alternative depending on the amount and location of the vegetative treatment. To the extent that alternatives treat the warm/dry forest types and to some extent the cool/moist, risk of uncharacteristic stand replacing fires is reduced. It should be kept in mind that except for the creation of fuel breaks and the ability to control fires the risk of fire may not be dramatically reduced. However, the duration and intensity of fire in the treated areas would be reduced resulting in effects to the watershed that are more in line with historic processes.

Those watersheds (in particular those within the shale portion of ELU 4) that undergo an uncharacteristic stand replacing fire over a large portion of the watershed will most likely experience excessive water yields that result in degrading (transport capacity exceeding sediment input) conditions with downcutting occurring

and possible lowering of the surrounding water table. As such the physical integrity of the stream would not be maintained and beneficial uses would not be protected.

C. Direct and Indirect Effects by Alternative

Water and sediment yield increases are displayed in the Project File. Water yield increases were calculated for Beaver Creek, Vermont/Priest/Long, Beaver Dam Gulch, Lambing Camp, Benton/Ohio/Kentucky, Bridge, Thomas, Slough/Elk, Moose, Mule, Pickfoot, and Atlanta. Water yield increases were not calculated for Rubinson, Wagner, and Antelope Creeks given the extreme dry nature of these watersheds. Sediment yield was calculated for Vermont (including Vermont, Priest, Long, Skidoo, and Beaver Dam Gulch), Atlanta, Elk, and Slough Creek. These drainages were selected due to their sensitivity concerning fisheries. Where appropriate (Vermont Creek, for example), analyses extended below the Forest boundary.

Calculation numbers are displayed in the project file rather than here because what is important is the linkage of these and other variables to the ability of the stream to transport sediment and changes that will occur to the stream channel due to aggrading or degrading conditions. Changes in stream channel morphology and similarity ratings were done for all of the drainages within the analysis area. The discussion under effects common to all alternatives discusses what these effects are except for Alternative F.

In addition the project file contains the acres treated in warm/dry, cool/wet, grasslands, and total for each watershed in the project area. This was done for comparative reasons to help aid in assessing the risk from uncharacteristic stand replacing fire for each alternative. The project file also contains projections of the miles of stream going from low similarity to moderate and from moderate to high as a result of the revised allotment management plans. This is projected for each watershed.

1. Alternative B

The direct and indirect effects for Alternative B would be similar to those outlined under effects common to all action alternatives. Alternative B does not have any vegetative treatment associated with it which will result in the continued development of ladder fuels in the warm/dry forest types. As a result the potential for uncharacterisitc stand replacing crown fires will increase in a forest type that is not adapted to stand replacing fires.

2. Alternative F

The direct and indirect effects from this alternative alone would be similar to those discussed under effects common to all alternatives except for Bridge Gulch. The additional water yield for Bridge Gulch would result in a degrading (transport capacity exceeding sediment input) condition with possible downcutting occurring and possible lowering of surrounding ground water level. As such the physical integrity of the stream would not be maintained and beneficial uses would not be protected. Mitigation measures to ameliorate these effects are discussed under cumulative effects.

D. Cumulative Effects

Cumulative water and sediment yields are also presented in the Project File.

1. Alternative A

The cumulative impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions will not result in changes to stream channel morphology. Water and sediment yields will be in balance and streams are expected to remain in a steady state equilibrium. Beneficial uses will be protected and State water quality standards will be met. In the long term this action when coupled with other reasonably foreseeable actions (such as the riparian vegetation improvements associated with the revised

allotment management plans) will result in stream segments with a low similarity moving towards a moderate or high similarity (Projections are for 11.8 miles going from moderate to high similarity and 2.5 miles going from low similarity to moderate in the short term. In the long term there will be an additional 2.9 miles going to high similarity and 1.9 miles going to moderate. Approximately 2.9 miles will remain in low similarity). As a result of moving towards the desired condition the long term stability will enable streams to withstand events that under existing conditions, would result in significant changes to stream channel morphology.

In the long term this alternative would contribute to watershed stability assuming additional vegetation treatments are implemented in the future which move the landscape toward the desired conditions described in the Landscape Analysis.

2. Alternative B

In the short term the cumulative impact of this action when added to other past, present, and reasonably foreseeable future actions will not result in changes to stream channel morphology. Because of riparian improvements associated with revised allotment management plans (see Alternative A above), there will be a shift away from low similarity streams to moderate or high similarity streams.

Should this alternative be implemented, the potential for more intense and longer duration fires affecting large portions of watersheds would be greater than the other alternatives over the long term. The potential for such fire activity would increase with time as fuels increase particularly in the cool, moist forests. The removal of more moist forests would likely be extensive enough in some watersheds to increase peak flows resulting in channel instability especially in the shale portion of ELU 4. In addition, vegetation recovery would be very slow following stand replacement fires in the warm, dry forests and would be hampered in the cool, moist forests due to soil damage where fuel conditions were conducive to high intensity, long duration fire. Riparian recovery could be set back as a result.

3. Alternative C

The cumulative impact of this action when added to other past, present, and reasonably foreseeable future actions will not result in changes to stream channel morphology. Water and sediment yields will be in balance and streams are expected to remain in a steady state equilibrium. Beneficial uses will be protected and State water quality standards will be met. In the long term this action when coupled with other reasonably foreseeable actions, such as the riparian vegetation improvements associated with the revised allotment management plans (see Alternative A above), will result in stream segments with a low similarity moving to towards a moderate or high similarity. By moving towards the desired condition, long term stability will enable the streams to withstand events that under existing conditions would result in significant changes to stream channel morphology.

In the long term this alternative would contribute to watershed stability assuming additional vegetation treatments are implemented in the future which move the landscape toward the desired conditions described in the Landscape Analysis.

4. Alternative D

Except for Beaver Dam Gulch the cumulative effects for Alternative D are the same as Alternatives A and C. The effect of this alternative when added to other past, present, and reasonably foreseeable actions will result in a degrading (transport capacity exceeding sediment input) condition to Beaver Dam Gulch. There could be possible downcutting and a lowering of the surrounding ground water level. These effects are expected to be minor as water yield levels do not greatly exceed what is thought to to be the upper allowable level. Effects will not be noticed beyond the mouth of the canyon on Beaver Dam Gulch (as the stream becomes dry when it encounters an alluvial fan); nevertheless, the stream channel integrity is not expected to be maintained.

To avoid stream channel degradation, a reduction of cutting by three equivalent clearcut acres in Beaver Dry Gulch would be necessary. This would be an effective, no-cost effort and could be accomplished by leaving three more acres in unit 28 in reserve.

In the long term this alternative would contribute to watershed stability assuming additional vegetation treatments are implemented in the future which move the landscape toward the desired conditions described in the Landscape Analysis.

5. Alternative E

Except for Vermont/Priest/Long watershed and Beaver Dam Gulch the cumulative effects for Alternative E are the same as Alternatives A and C. Due to the degraded nature of Vermont Creek in Section 28 the excessive water yield from this action when combined with other past, present and reasonably foreseeable actions would result in additional bank erosion. These aggrading conditions would occur in critical spawning habitat in lower Vermont. Effects to Beaver Dam Gulch would be similar to those described in Alternative D only more evident. In both of these drainages the physical integrity of the stream will not be maintained and beneficial uses will not be protected. As such, State water quality standards will not be met for these two drainages.

Mitigation measures which reduce the amount of cutting in Beaver Dam Gulch by 70 equivalent clear cut acres and by 138 equivalent clear cut acres in the Vermont/Priest/Long watershed would be sufficient to avoid the above expected effects. This could be accomplished by leaving 208 more acres in reserve in Vermont/Priest/Long, Skidoo, and Beaver Dam Gulch, of which 70 acres must be in Beaver Dam Gulch. This would be effective in reducing the risk of any stream channel degradation occurring in Beaver Dam Gulch or lower Vermont Creek.

In the long term this alternative would contribute to watershed stability assuming additional vegetation treatments are implemented in the future which move the landscape toward the desired conditions described in the Landscape Analysis.

Due to the spatial arrangement of the treatment units and the fact that several watersheds are treated extensively, Alternative E would be the most effective of the action alternatives in terms of short term watershed stability.

6. Alternative F

Except for the Vermont/Priest/Long watershed and Bridge Gulch the cumulative effects for Alternative F are the same as Alternatives A and C. Due to the existing condition of Vermont Creek in section 28 the excessive water yield from this alternative when added to other past, present and reasonably foreseeable actions would result in additional bank erosion. These aggrading conditions would occur in critical spawning habitat in lower Vermont. The cumulative effects to Bridge Gulch will be the same as those described under direct and indirect effects. In both of these drainages the physical integrity of the stream will not be maintained and beneficial uses will not be protected. As such State water quality standards will not be met for these two drainages.

Mitigation measures which reduce the amount of cutting in Bridge Gulch by 44 equivalent clear cut acres and by 15 equivalent clear cut acres in the Vermont/Priest/Long watershed would be sufficient to avoid expected effects. This could be accomplished by leaving 44 more acres in reserve in unit 18 and by leaving 15 more acres in reserve in any of the drainages that feed lower Vermont Creek (Vermont, Long, Priest, Skidoo, and Beaver Dam). This would be effective in reducing the risk of any stream channel degradation occurring in Bridge Gulch or lower Vermont Creek.

In the long term this alternative would contribute to watershed stability assuming additional vegetation treatments are implemented in the future which move the landscape toward the desired conditions described in the Landscape Analysis.

3. AIR QUALITY

A. Introduction

The following section provides a description of the effects on air quality that could result from prescribed burning activities within the Implementation Area.

Prescribed burning would take place during the spring, summer, or fall, when prevailing southwesterly to westerly winds would assist in dispersing smoke away from wilderness areas. Sagebrush burning would be short duration events with very limited amounts of smoke effecting residential communities..The East Helena Nonattainment area would not be affected by any of the proposed activities. Effects on the air resource are within Forest Plan standards.

The Timber Stand Data Base was used to predict the amount of fuel that would be available to burn resulting from harvest activities. In addition, this analysis used the computer model (Consume) to predict the amount of particulate matter (PM-10) produced by burning. Information about the Consume program is available in CONSUME, Users Guide, PNW-GTR-304, Jan. 1993.

B. Effects Common to All Action Alternatives

These alternatives each contain prescribed burning as an important feature. The types of burning analyzed include machine pile burning, underburning or jackpot burning, broadcast burning, timber burning, and sagebrush or grassland burning.

1. Particulate Emissions

Particulate matter has been determined to be a major source of concern in smoke from burning wood. Specifically the particulate matter less than ten millimeters in diameter has been shown to be of special concern to human health. Particles of this size have the ability to penetrate the inner lungs. The results of implementing any of the alternatives that contain prescribed burning as a treatment would result in a temporary increase in suspended particulate matter (PM-10). A table describing the amount of PM-10 produced by alternative is located in the project file.

Emissions under typical wildfire conditions would result in the estimated consumption of 18.5 tons of fuel. This would result in the production of 379 pounds of PM-10 per acre. Wildfires typically produce more PM-10 per acre (27 lbs/ton of fuel) than prescribed burns because wildfires usually burn under drier conditions.

2. Duration of Burns

The effect of smoke produced from sagebrush burns usually will last for an hour or two. Sagebrush burns typically have an active flaming front with very little smouldering fire. This is because of the small diameter of the fuel that is burned.

Underburns, machine pile burns, timber burns, and broadcast burns have the potential to smoulder for days after ignition. This is because these burns involve larger diameter of fuels. These burns also smoulder in the duff layer and can potentially produce smoke for days after the initial ignition. Smouldering fires produce more smoke per ton of fuel consumed than fires burning during the ignition phase.

3. Human Health

All prescribed burning would occur within Meagher County. The people impacted the most would be those individuals that reside close to the actual burn units. Approximately 15 ranches are located within two miles of the Forest boundary where burning would occur. These people will be impacted the most by burning.

Five primary air toxics are presently being assessed relative to the exposure of humans to smoke from prescribed and wild fires, these include; Acrolein, Formaldehyde, Carbon Monoxide, Respirable Particulates, and Benzene.

Currently, modeling to predict concentrations of air toxics downwind from a burn do not exist. Due to dilution of these air toxics with fresh air, exposure is less harmful the further away an individual is from the burn. The persons that would be impacted the most by the effects of burning would be agency personnel directly involved with the burning projects. The number of personnel involved would be kept to an absolute minimum. These individuals would be trained, physically fit and would be provided with masks that filter out the larger particulates.

4. Vehicular Emissions

Emissions produced by vehicular traffic necessary to accomplish the project will be produced. There may be a possibility that public vehicular traffic would be delayed temporarily if a smoke hazard is created while burning a unit. This would occur to the extent necessary to provide for public safety.

B. Direct and Indirect Effects by Alternative

1. Alternative B:

Selection of the no action alternative would not result in any increase in PM emissions resulting from management activities. Visibility would also not be reduced.

The long term effects of selecting the no action alternative would result in an eventual increase in PM-10 emissions resulting from wildfires. Wildfires produce more PM than does prescribed burning the same acres because wildfires typically burn more fuel per acre. Wildfires usually burn more fuel per acre because they normally burn when fuel moistures are lower than during prescribed fires.

D. Cumulative Effects

There would be no reasonably foreseeable burning projects within the Implementation Area. Fall burns could potentially add to smoke already produced by homes heated by burning fuelwood.

Burning produces carbon dioxide (CO^2), which plays an important part in the Carbon Cycle. The effects of the amount of CO^2 produced by this project and its potential to increase the "greenhouse effect" is well beyond the scope of this analysis. The suspended particulate matter will settle out of the atmosphere with the passage of time.

E. Mitigation Measures

The potential negative impacts to air quality that could be caused by prescribed burning can be reduced by the following measures.

- Conducting burns during periods of adequate ventilation can drastically reduce any temporary degradation in air quality. Burning during the spring months of March, April, and May will usually result in good to excellent smoke dispersion. This is because this season of the year usually has windy days and seldom experiences any inversions. Normally, fuels have a higher fuel moisture content at this time which reduces the amount of fuel consumed during the burn, which in turn reduces the amount of PM-10 produced.

- Complying with all of the requirements of the Montana Air Quality Bureau, including the daily smoke management forecasts issued by the Montana Smoke Monitoring Unit during the fall, will assure

adequate ventilation during fall burning. The Smoke Monitoring Unit issues advisories daily that indicate when inversions are likely, and when adequate mixing winds are present.

- Quick mop-up of burns would reduce smoke emissions, especially on the underburns. This effort can be expensive but would occur within the available budget.

4. NONFOREST VEGETATION

A. Introduction

Effects for the grassland/shrublands are described in relation to plant composition, desired condition, biomass productivity, regeneration, patch size and integrity, livestock behavior, noxious weed risk, wildlife habitat attributes, and effects to sensitive plant species.

Non-forested habitat types within each action alternative will be treated with prescribed fire. This will be low intensity spring burns on the rough fescue and bluebunch wheatgrass dominated sites. Special species treatment include the bitterbrush and aspen community types. Bitterbrush will be protected from direct fire treatment but coniferous canopy will be reduced to promote recovery and regeneration of bitterbrush plants. Aspen will be burned in the fall to kill live trees in the clone and stimulate suckering and regeneration. Some clones may be mechanically treated to provide favorable burning conditions.

The majority of grassland treatment areas within the Implementation Area are rough fescue dominated. This species comprises the majority of grassland vegetation on warm, dry and cool, moist sites. Bluebunch wheatgrass occurs primarily on the warm, dry sites usually lower on the slopes and fingers into rough fescue sites. Conifer colonization is not a major concern in the implementation area although it does occur in some treatment areas.

Table IV-1 displays the acres of grassland treatments within the seven livestock allotments contained in the Implementation Area.

TABLE IV-1 GRASSLAND ACRES TREATED BY ALLOTMENT

ALLOTMENT	ALT. A	ALT. B	ALT. C	ALT. D	ALT. E	ALT. F
MULE CREEK	546	0	431	245	43	487
CEMENT	0	0	0	0	0	0
THOMAS	1015	0	747	655	0	704
WATSON	235	0	221	115	257	78
SPRING CREEK	927	0	887	196	219	994
WAGNER	150	0	170	140	150	150
KEENE	40	0	51	51	38	51
TOTAL	2913	0	2507	1402	815	2464

Sensitive plant species are discussed in relation to harvesting techniques as well as prescribed burning effects upon potential habitat of these species. Species having potential habitat include pink agoseris, short-styled columbine, yellow-lady's slipper, northern rattlesnake-plaintain and Hall's rush.

B. Effects Common to All Action Alternatives

Prescribed burning in rough fescue grasslands will dramatically increase plant species diversity for the first three to five years. There will be a forb flush for the first few years (3-6 years) with mountain lupine and prairie smoke dominating the sites treated. Grass species, such as Columbia and Richardson needlegrasses are likely to increase for a short period (3-6 years). These plants will serve to provide good "nurse" crops by protecting the soil and increasing biomass available as organic material for incorporation into the soil during dormant months. Rough fescue, bluebunch wheatgrass and Idaho fescue will produce more photosynthetic material and build stronger and deeper root systems. Seed production will be reduced one to three years following treatment as the plants recover and energy is transferred to root system growth. Area taken up by senescent material in the bunchgrasses in the stagnant state or where there was clump mortality will begin to be covered by seedlings and younger plants. The age class diversity of perennial grass species will be more diverse.

Gross biomass production may change as much as 50-200 percent in the first three to five years due to the forb/needlegrass flush but will level out to preburn levels within five years. There will be little, if any, net change in productivity from preburn levels. Any change will be the replacement of forbs and needlegrasses to rough and Idaho fescue and bluebunch wheatgrass rather than in productivity.

Within the grasslands, the needlegrasses and forbs will decline in frequency and abundance. Without further disturbance, the communities will become dominated by rough fescue and other bunchgrasses. Net productivity will not change significantly. Production increases resulting from forb flush and needlegrass dominance will have stabilized as soil nutrients from the fire are used up. The reduction in available nutrients will also influence the palatability so that utilization by ungulates will occur mostly as a result of the increase in photosynthetic (green) plant material.

Patch size of grasslands will be restored to historical ranges in treatment areas. Removal of the colonization by Douglas-fir and limber pine will allow rough fescue and Idaho fescue to again dominate the sites they previously held. Bitterbrush stands will increase in size. Removal of the coniferous overstory will allow reestablishment of this shrub species. Decadent plants will not recover but seedlings will become more abundant. This will be more of a long term process due to soil chemistry changes from coniferous species being present for the past 20-50 years in some areas.

Bitterbrush will slowly increase in density with a primarily young age class dominating each site treated. Germination may take several years to occur depending on favorable climatic factors but the conditions for this event are more favorable than with the conifer overstory. Large treatment areas will also provide the opportunity for better survival success with more plants available to ungulate grazing. This would allow a reduced likelihood of plants being grazed heavily by browsers.

Aspen clones will show significant regeneration as a result of fire. Older trees within the clones will die and produce growth hormones that will stimulate suckering within the clone. Regeneration will occur rapidly following the fire. It is expected that a tremendous suckering response will occur with an estimated 2,000-10,000 stems per acre within the first year, depending on the condition of the clone at the time of treatment. Patch size may be increased as the suckering of young trees extends outside of the current or pretreatment areas but this is more related to climatic variables than historical patch size.

Aspen regeneration areas will begin to thin out as suckers compete with each other for nutrients, water, and light. Natural thinning occurs throughout the life of the clone but this activity is more evident within 2-25 years of the disturbance that caused clone regeneration to take place. Actual patch size may be restored to the original size through time as the thinning takes place.

Low intensity fires in the grasslands will help to maintain that habitat over time. The fires will replenish the vegetation making it more palatable for big game. Palatability of grass species will improve immediately

because of the increase in protein accumulation in the plants. Also, more green, soft material is available to grazing ungulates. Ungulates prefer the moist, soft grass to decadent, senescent material. Treatment areas are designed to be fairly large to minimize the effects of livestock or big game moving onto preferred foraging sites following a burn event.

Livestock grazing will be affected on a short term basis. Even though most of the units selected are either not grazed or grazed lightly, annual pasture scheduling will be modified to ensure that sufficient fine fuels are left to carry the fire. Cattle use will also be deferred for two growing seasons following a burn to allow adequate recovery time for the plant species.

Disturbance associated with roads aids in the spread of noxious weeds and non-native vegetation. This alternation in vegetation produces changes in habitats relative to structure and species composition.

Habitat for the columbine and northern rattlesnake-plaintain (orchid) is found exclusively within the Rubison Drainage. Action alternatives that propose conifer manipulation in the Rubison drainage would be detrimental to the existence of these plants. Harvesting, as well as timber burning that removes the moss layer and opens the canopy is detrimental to the existence and perpetuation of these two species. An exception to this would include a cool underburn that does not remove the moss layer or significantly reduce the canopy is not likely to reduce the potential existence of these plants.

Habitat for yellow lady's slipper, pink agoseris and Hall's rush are found in wet meadows that occur between Atlanta Creek and Elk Creek. Hall's rush requires high elevation habitat requirements. Because all action alternatives will have no impact on riparian or high elevation areas, if these plant should occur, they will not be impacted.

C. Direct and Indirect Effects by Alternative

1. Alternatives A and C

Approximately 44 percent in Alternative A and 42 percent in Alternative C of the total grassland acres within the Implementation Area will be treated with prescribed fire. With the reintroduction of fire, these acres will be moving towards the desired future condition. Species diversity will be increased and the dominant species maintained will be rough fescue and bluebunch wheatgrass. Soil productivity will be enhanced and then stabilize.

There is potential for heavy elk use in the Thomas area following prescribed burning activities. This area is identified as key winter range and it is likely that the animals will concentrate on burned areas, primarily in unit A40 or C33, for the first few years. This would slow recovery of the burned area and may put more grazing pressure on the immediately adjacent areas that aren't burned.

Bitterbrush treatment will occur primarily in the Kentucky/Bridge/Thomas area. The effects will be as described in General Effects except in unit A40/C33. This area is primarily a grassland unit with two patches of bitterbrush on south slope aspects. These two sites within the unit will be protected from prescribed fire activities.

Aspen is located in unit A4/C31. There is representation of both seral and stable aspen in this area. Some site prep will be done such as mechanical felling of trees within the clones to provide fuels to carry a fire or as a catalyst to stimulate root suckering. This will provide protection of any regeneration from grazing ungulates. If good regeneration takes place following mechanical treatment, the clone will not be burned. On those areas that do not respond to mechanical treatment, prescribed burning will be done in the fall and the site protected from ungulate grazing through fencing. Effects of treatment are described in the General Effects. It is expected that some natural regeneration will take place in the Atlanta/Mule Creek area in units

F1 and F4 following harvest activities. There is enough aspen adjacent to and within the coniferous communities in these units to regeneration following overstory removal.

2. Alternative B No-Action

Grassland communities will be maintained in their current ecological condition. Plant species diversity and annual biomass production will continue to be low and static. Dominant grass species, at least 60 percent of the total plant species representation, will be rough fescue with Idaho fescue as a subdominant. Age classes will be almost exclusively older plants with a build up of decadent material within the basal clump. As this material accumulates it increases the mortality risk of rough fescue in the event of a fire, wildfire or human-caused.

Colonization by coniferous species will continue to cause a reduction in the size of the grasslands overall. Young trees have and will continue to fill in the parklike openings that occur in places such as the Kentucky Bridge and Long Gulch ridges or Moonshine area. As the overstory canopy by Douglas-fir increases, understory species will first respond by producing smaller plants and will then eventually be replaced by plant species more adapted to acidic soils. Bitterbrush communities in the Kentucky Bridge area will be lost as the plants die out due to soil chemistry changes and competition for light and water.

The large open grasslands that occur on the mid to lower elevations will be colonized by heavy regeneration of Douglas-fir as it fingers out from older, forested areas. This younger generation of conifers will choke out remnant grassland vegetation more rapidly than that described for parkland changes. It will also create a biotic environment that favors insect and disease spread into the historic forested stands. Finally, these younger trees provide ladder fuels from the grasslands into the forested stands and makes it more at risk to catastrophic fire events.

Aspen stands will respond two ways. Seral aspen stands will be replaced by conifers, probably Douglas-fir. Some remnants will survive over the years to keep the clone alive until some kind of disturbance that opens the stand causes the clone to regenerate. Stable aspen stands will continue to maintain themselves until some kind of disturbance kills enough of the stand to initiate a vegetative regeneration event.

3. Alternative D

Approximately 26 percent of the total grassland acres within the Implementation Area will be treated with prescribed fire. With the reintroduction of fire, these acres will be moving towards the desired future condition. Species diversity will be increased and the dominant species maintained will be rough fescue and bluebunch wheatgrass. Soil productivity will be enhanced and then stabilize.

There is potential for heavy elk use in the Thomas area following prescribed burning activities. This area is identified as key winter range and with the reduction in the number of acres/units in here from the proposed action, it is likely that the animals will concentrate on burned areas, primarily in unit D50, for the first few years. This would slow recovery of the burned area and may put more grazing pressure on the immediately adjacent areas that aren't burned.

No treatment will occur in aspen areas. The effects are the same as described for Alternative B for aspen. Seral aspen stands will be replaced by conifers. Stable aspen stands will continue to maintain themselves until some kind of disturbance kills enough of the stand to initiate a vegetative regeneration event.

Bitterbrush treatment will occur in the Kentucky/Bridge/Thomas area. The effects will be as described in General Effects except in unit D50. This area is primarily a grassland unit with two patches of bitterbrush on south slope aspects. These two sites within the unit will be protected from prescribed fire activities.

4. Alternative E

Approximately 11 percent of the total grassland acres within the Implementation Area will be treated with prescribed fire. With the reintroduction of fire, these acres will be moving towards the desired future condition. Species diversity will be increased and the dominant species maintained will be rough fescue and bluebunch wheatgrass. Soil productivity will be enhanced and then stabilize.

Aspen treatment is limited to two areas in unit E37. The effects will be the same as described in General Effects for both stable and seral aspen stands as there is one of each within the unit. Regeneration may be at risk due to such a small area being treated and the succulent new growth will provide preferred foraging sites for ungulate grazing.

No treatment will occur in bitterbrush communities. The effects are the same as described in Alternative B for bitterbrush. Bitterbrush communities in the Kentucky/Bridge area will be lost as the plants die out.

5. Alternative F

Approximately 36 percent of the total grassland acres within the Implementation Area will be treated with prescribed fire. With the reintroduction of fire, these acres will be moving towards the desired future condition. Species diversity will be increased and the dominant species maintained will be rough fescue and bluebunch wheatgrass. Soil productivity will be enhanced and then stabilize.

Bitterbrush treatment will occur in the Kentucky/Bridge/Thomas area. The units that have bitterbrush are units F44-50. Removal of the overstory and protection of plant populations will restore the vigor and age class representation. This will be a long term process and may take many years due to the germination and recovery characteristics of the plant. The effects will be as described in General Effects except in unit F48. This area is primarily a grassland unit with two patches of bitterbrush on south slope aspects. These two sites within the unit will be protected from prescribed fire activities.

Aspen is located in units F51 and F53. There is representation of both seral and stable aspen in these units. Some site prep will be done such as mechanical felling of trees within the clones to provide fuels to carry a fire or as a catalyst to stimulate root suckering. This will provide protection of any regeneration from grazing ungulates. If good regeneration takes place following mechanical treatment, the clone will not be burned. On those areas that do not respond to mechanical treatment, prescribed burning will be done in the fall and the site protected from ungulate grazing through fencing. Effects of treatment are described in the General Effects. It is expected that some natural regeneration will take place in the Atlanta/Mule Creek area in units F1 and F4 following harvest activities. There is enough aspen adjacent to and within the coniferous communities in these units to regeneration following overstory removal.

D. Cumulative Effects

Generally, areas not identified for treatment were those areas that are or have been overgrazed by ungulates, primarily livestock. Treatment of these areas at this time would only serve to further degrade them. Allotment management plan revisions are planned for 1995. Objectives within the plans will include improving grasslands to higher ecological conditions. When conditions improve, as expected, the areas will be proposed for burning.

Since natural processes such as fire and grazing have not been a factor in maintaining these sites for many years, many of these grasslands are at risk to high intensity fire events that could damage the long term productivity of the areas. Soil loss and weedy plant species change may occur with a high intensity fire. Natural fire cycles serve to stimulate the soil productivity and natural species diversity. More importantly, it creates an environment that is more in line with natural function. By re-introducing controlled fire into the system initially, plants will maintain their size and spatial arrangement so that in the event of a wildfire five to

ten years following treatment, the mortality rate of rough fescue or other featured species will be reduced. Overall, this reduces the likelihood of long term detrimental effects to the plant communities in the event of catastrophic wildfire events. No significant change in livestock grazing patterns is anticipated following burn treatment.

Since prescribed fire will reduce the intensity of future wildfires, the cost for suppression of wildfires within these areas will also be reduced. Elimination of fuel buildup may make it tactically easier to suppress wildfires in adjacent areas by using the controlled fire units as temporary barriers to fire spread. This is valid for both timber and grassland burn units.

There is a low risk of noxious weed spread for all of these alternatives since most current infestations are avoided and not burned or disturbed. Due to the nature of noxious weeds, the risk of increased infestations is present whether the area is burned or not.

Of the potential habitat that exist for the columbine and northern rattlesnake-plantain, in the Rubison drainage, over half of those lands are under private ownership. These lands have been recently logged and logging is expected to continue.

Alternatives that create roads into or harvest in or by wet meadows could impact potential habitat areas of the Hall's rush, yellow lady's slipper and pink agoseris by introducing noxious weeds in addition to funneling livestock into the areas.

Alternative B

The most influential event affecting the current condition of the vegetation is the lack of regular fire events for the past 100 years. Natural fire cycles within grassland habitat types is six to ten years. Under catastrophic fire conditions, the build up of fine fuels and the continuous canopy of the grasses will contribute not only to a higher mortality of individual plants but also a more complete burn of a grassland area. Fires naturally burn in a mosaic pattern following natural fuels and winds. With the build up of dead material within the grass clumps, fire will smolder in the crowns and kill the plants. This leaves the soil highly vulnerable to weed or invader species and soil loss. Shorter cycles will not allow sufficient recovery time and longer cycles create conditions where clump mortality is high and recovery time is also increased (Antos et al, 1983).

Under this alternative, there will be no immediate effect on livestock grazing or the permittees.

5. FOREST VEGETATION

A. Introduction

In this environmental analysis, active vegetation management is considered utilizing combinations of timber harvest and prescribed fire. These tools produce varying effects which will be described in relation to effects on forest health (composition, sustainability and mortality), regeneration, wildlife habitats, fragmentation and old growth.

B. Effects Common to All Action Alternatives Using Prescribed Fire

Prescribed fire was utilized as a tool to manipulate forest vegetation in stands where timber values were marginal in relation to the costs (both economic and environmental) of harvest. These burns are prescribed on the warm/dry sites of ELU 4 and are intended to move the forest towards a more natural and sustainable density , which was identified in the desired condition, by killing some of the smaller trees and retaining the larger ones.

Because fire is not uniform, utilizing prescribed fire induces some degree of variability within treated areas. The resulting mosaics of varying heat intensities and duration depend upon fuel loading, slope and burning conditions. This results in differing effects or results from fire within the treatment area that may range from individual or groups of overstory tree mortality to unburned islands. This variability is part of the natural process of fire. Depending on factors such as habitat type and seral stage of the stand this variability also creates a variety of successional pathways for the vegetation in a treatment area. It should be recognized that exact control of the fire and the results of the final outcome are predictable in general but effects within a treated area are not precise or uniform.

1. Forest Health

For conifers, the effects of an underburning ground fire will be to kill smaller trees and thin forest stands while minimizing overstory mortality. The thinning will reduce ladder fuels within the forest which will result in forest conditions less prone to crown fires. Thinning will also improve forest health by reducing competition between trees for nutrients, sunlight and water. Populations of western spruce budworm will be reduced as tree vigor improves and host trees for the insects are reduced.

2. Snags and associated Wildlife Habitat

Where larger trees are killed in the prescribed burn, they will be left on site as snags. These trees will undergo a process of deterioration over time which varies depending on the species and site conditions. Initially, these dead trees will become host to a series of fungi and insects which thrive off the decomposing cambium of the tree. These species in turn attract birds such as woodpeckers who consume them. As time passes the dead trees become more rotten or "soft" and birds are able to excavate cavities within them. These cavities will provide homes for the initial excavators as well as other species who will later occupy the cavities. The upper branches of the snag may be utilized as perch sites for birds of prey. Eventually these snags will fall. During this stage of their deterioration excavated cavities may provide denning sites for small mammals, or bears. All through the process of decomposition the snags will host a variety of microflora and fauna.

The forest type functions with non-lethal unevenaged processes under the range of natural variation. This produces a snag resource which is constant on the landscape as individual trees succumb to old age, pathogens and occasional fire induced mortality.

3. Fragmentation

Prescribed fire treatments will be smaller in scale than what probably occurred under natural conditions. Treatments proposed are within the watershed scale, however, the range of natural variation may have involved multiple watersheds in a given fire. This lesser scale of treatment was proposed to minimize disruption to other resource uses in the area as is identified in the Big Belts Landscape Analysis. However, these prescribed treatments do treat landscapes with a natural process. With future similar management actions, the treatments will further contribute to ecosystems which are more sustainable and more representative of their natural structure, function and processes.

4. Old Growth

The warm/dry forests of ELU 4 have developed more dense stand structures since fire control. Prescribed underburning will favor the development and maintenance of old growth forest conditions because larger and older trees will be targeted for retention. The treatment of these forests will move them in balance with the conditions with which they naturally evolved which makes them more sustainable and restores the niche in which plants and animals of warm/dry old growth forests evolved.

C. Effects Common to All Alternatives Using Timber Harvest

Timber harvesting is another tool which may be employed to attain the desired vegetative condition. Timber harvest differs from prescribed fire because the end results are more predictable. Individual trees and forest stands to be treated are visited and selected and special features such as wet areas and existing snags can be effectively protected from damage. Contractual specifications and sale administration insure a higher degree of confidence in the predicted outcome.

In the warm/dry forests of ELU 4 the goals of harvest are similar to those of prescribed fire. Stands would be thinned from below removing smaller trees. As with prescribed fire, ladder fuels would be removed which would reduce the potential for stand replacing fire. Also competition and stress between trees would be reduced resulting in improved forest health. These warm/dry forests of ELU 4 would be managed with unevenaged prescriptions.

Following harvest stands would be underburned with low intensity fires which would result in rejuvenating the nutrient cycles favored by fire. These underburns would burn about 2/3 of the treatment area acreage. The effects of these fires would be similar to those described for prescribed fire. Harvest would reduce fuel loading and ladder fuels in these forests which would reduce potentials for overstory mortality. Burned ladder fuels would be left on-site. Eventually these fuels would fall and would contribute to coarse woody debris on the forest floor which promotes additional nutrient cycling. In areas which were not underburned individual trees of sapling through intermediate sized trees would be retained to allow for gradual replacement of overstory trees.

Cooler/more moist forests in ELU 4 and ELU 2 tend to function with lethal, stand replacing processes. These forests will be managed with regeneration harvest systems and commercial thinning. Incorporated within treated areas will be untreated stand reserves. Additionally, treated areas with seedtree or shelterwood prescriptions will have variable densities of individual reserve trees retained. These reserves will create structural diversity both within and between stands.

As a new age class of trees regenerates within treated areas the retention of overstory trees and stand reserves will create two storied stands. The overstory trees will eventually age into an older forest component over time and will contribute to an old growth component within treated areas. These forests will be managed with evenaged silvicultural systems which periodically regenerate the stand. This differs from the warm/dry forests of ELU 4 where unevenaged management will maintain a continuous forest canopy over time.

Some of the reserve trees in treatment areas and trees adjacent to treatment areas will be subject to blowdown or breakage during windstorms. This blowdown also occurred under natural processes following stand disturbances and will contribute to down coarse woody debris. Large fuels on the forest floor are an important nutrient base for soils. They also provide habitat for some animals.

1. Forest Health

To reduce the potential for insect and disease outbreaks non-host species will be regenerated as necessary. For example, lodgepole pine will be the preferred species regenerated under a Douglas-fir overstory susceptible to western spruce budworm, and Douglas-fir would be the preferred species regenerated where dwarf mistletoe exists in lodgepole pine. This diversity of species will promote forest health in that not all trees will be susceptible to the same pathogens.

At the forest landscape level, modification in species composition and stand structure has the potential to improve overall forest health. This would be accomplished by modifying stand structures and seral stages. For example, Douglas-fir stands on warm/dry forests would be modified to be less favorable habitat for western spruce budworm. Where lodgepole stands were treated seral stages would be regenerated which would not be susceptible to mountain pine beetle. Dwarf mistletoe infections in lodgepole pine could also be

reduced through appropriate stand treatments and species conversion. These insects and diseases all affect individual tree health. They also contribute to insect and disease outbreaks at a landscape level. When significant proportions of an area are in similar seral stages the potential for widespread outbreaks of pathogens is more probable.

Development of additional early seral stages within the area would improve long term forest sustainability. Diversity in age class structure and seral stage lends overall stability to an area as not all forests are susceptible to the same disturbance processes (pathogens, fire, etc.) simultaneously.

In lodgepole pine stands silvicultural treatments will reduce the potential for damage by mountain pine beetle. Removing all lodgepole pine eliminates the possibility of mountain pine beetle epidemics. Thinning stands has also shown to greatly reduce the chances of a mountain pine beetle outbreak because the treatment changes the internal microclimate of the stand.

In the Beaver Creek area significant areas of forest were killed by a severe winter in 1989. Removal of these dead trees coupled with planting of these stands is proposed in Alternative C. The effects of this treatment will be to aggressively deal with this forest mortality and take steps to restore forests in the area.

Planting these stands will promote species diversity and insure full stocking of the site. These stands currently have sparse live stocking of climax species (generally Douglas-fir and subalpine fir). Planting will promote species diversity by introducing species such as lodgepole pine, Douglas-fir and Engelmann spruce, where appropriate. The planting will also increase stand densities which will allow the development of more interior stand conditions as trees grow.

2. Forest Succession

There are a variety of plant communities and successional stages associated with these forest types because disturbance processes periodically kill these forests, which induces their regeneration.

Following the death of a mature forest snags are abundant on the landscape. Over the course of a few decades these snags fall. There develops a period in the life of this forest type in which snags are limited, generally from 60 to 110 years after disturbance. If a lethal process does not again affect the forest, snags again begin to develop as seral species succumb to pathogens. Within harvest areas the untreated reserves and individual reserve trees will provide a snag resource as these trees and forests will be more advanced successionally.

Where new forests are regenerated a predictable path of forest succession will occur. Following evenaged treatment, areas will be regenerated with between 200 and 500 trees per acre. As these trees increase in size they will begin to shade the ground and reduce the presence of grasses and shrubs. After 10 to 15 years the seedlings should be about six feet in height. Natural tree regeneration will continue during this stand establishment process. When the trees attain a height of 15 to 20 feet a precommercial thinning may be prescribed to maintain tree vigor and to remove less desirable trees from the stand. This thinning generally retains about 400 to 600 trees per acre (tree densities have increased due to continued natural regeneration). Trees cut in such an operation are left on site to decompose.

As the trees continue to grow, shading of the ground will increase. After about 40 years the vigor of the understory vegetation will be greatly reduced. At 70 to 90 years of age the forest will be mature. Individual reserve trees and stand reserves will have aged into an old forest component which will create conditions favorable for old growth conditions. At this juncture, additional prescriptions to maintain forest health may be necessary.

Differences between harvest systems produce differing environmental effects. Clearcuts and seedtree harvest systems produce stands which are quite open immediately following treatment. Ground surfaces are

exposed to full sunlight which favors early successional plants and seral tree species. Shelterwoods and commercial thinning provides a more shaded environment which may favor more tolerant plants and climax tree species. The successional pathway which a stand will follow is affected by factors such as its habitat type, current successional phase and the silvicultural treatments applied. This is a complicated ecological relationship and is determined on a stand by stand basis in the site specific silvicultural prescription. Different alternatives do favor different silvicultural systems which produces varying environmental effects between alternatives.

Studies have shown that where two storied stands occur the understory often is not as productive as open grown trees. Growth reductions of up to 30 percent have been reported. This growth reduction reduces timber volume production in a stand and could delay development of some stand attributes such as hiding cover.

D. Direct and Indirect Effects to Forest Health by Alternative

Alternative B does not use timber harvest to manipulate forest stands. The effects of this no action alternative are similar to those described for the use of prescribed fire. In the warm/dry forest types ladder fuels would continue to develop which in turn increases the populations of western spruce budworm leading to increased forest mortality. The potential for stand replacing crown fires in this forest type also continues to increase.

This forest type has not evolved with stand replacing fires. The effects of such a fire would be to kill all, or most, of the trees. If a few trees survive the fire they would provide a seed source for a new forest. If all trees are killed there would be no seed source and renewal of the forest would be delayed. In both cases, the death of a significant portion of the mature old growth trees would take centuries of growth to restore. This would cause the forest stand structure to oscillate at a range of conditions which are abnormal, as identified in the landscape analysis, and are disruptive to other resources such as wildlife habitat, water quality, fisheries and recreation. The desired condition for this forest type is to prevent large oscillations in forest stand structure to maintain the functions of associated resources.

The cooler, moister forest types in the area would continue to age. Successional diversity would be reduced as more and more stands enter the same seral stage. This has implications for increased insect and disease activity as more of the forests become susceptible to the same insects or diseases simultaneously. Fires burning within the area could become more extensive as similar mature age classes predominate in the area.

Alternatives D and F favor silvicultural systems such as clearcut and seedtree harvest which will generate open stands. This produces less internal structural diversity and greater diversity between treated and untreated areas. This more open stand condition favors intolerant species and earlier seral stages within treatment areas. Less tolerant species are generally less prone to attack by pathogens and are somewhat more resistant to fire. These more intensive systems are more efficient economically as more trees are removed from the forest.

Alternatives A, C and E favor silvicultural systems such as shelterwood and commercial thinning to generate a less open stand which has greater internal structural diversity, and less diversity between treated and untreated stands. This will favor more tolerant species and more advanced successional stages within treatment areas. More tolerant species are sometimes more prone to attack by pathogens and are more susceptible to damage by fire. These less intensive systems have an economic cost as more trees are left in the forest.

Alternatives C, D and E fall short of treating the proposed acreages on warm/dry forest types. The reasons for this shortfall vary by alternative. Alternative C avoided marginal sites where harvest or burning were felt not to be worth the costs of the treatments. Alternative D attempted to maximize present net value and selected stands with greater timber volumes which are generally not the warm/dry sites. Alternative E was constrained to avoid roadless areas and, therefore, had physical limitations to the area available for treatment. The effect of not treating the proposed acreage will be to suffer increased acreages of diseased and dying

trees in the warm/dry forest types. Additionally, loss of the forest may occur should overstories die from fire or western spruce budworm depredation.

Alternative A falls short of forest treatments on the cool/moist forest types. Generally this shortfall was due to a lack of site specific information at the time the proposed action was first developed. Not attaining the target acreage treated will extend the rotation (of the total landscape) of this forest type. This will allow advanced forest successional stages to develop with associated increases in pathogens and fire susceptibility. Alternative D with its orientation to maximize the Present Net Value dollars persisted in selecting stands which had the greatest volume of standing timber. These forests generally occur on cool/moist slopes. Treating a larger amount of this forest than the Proposed Acreage will shorten the rotation of this forest type which will favor seral species at the expense of climax forest types.

4. Wildlife Habitats

The major difference between timber harvest and burning coniferous cover is the removal of biomass. Where timber stands are harvested, there are fewer snags and dead and down material available for rodents, insects and fungi. With either treatment big game security would be somewhat reduced and would not be expected to return until vegetation becomes hiding cover.

The various alternatives restore differing amounts of the warm/dry forest types to a sustainable state by returning their stand structure to within the range of natural variation. Future treatments will be needed to maintain the structure of these stands as well as to treat other warm/dry forests. This will insure sustainable habitat diversity within historic parameters.

Within the southern portion of the landscape area Alternative C treats the greatest number of acres in one area and treats large areas with a variety of treatments. Diversity is created between treated and untreated areas. Reducing the funneling effect with road closures will maintain suitable wildlife habitat within the area. Diversity of wildlife habitats on National Forest lands will be sustained with the vegetation treatments represented in various alternatives. National Forest lands do not represent the total landscape. Management of private land may prevent a total representation of historic vegetative patterns.

Alternative E treats major portions of the Lambing/Priest area with subsequent road closures. This alternative treats patch sizes similar to those that occurred naturally, and uses a variety of prescriptions to maintain the forest structural diversity. The effects to wildlife would be long term sustainability of habitats within this area.

Alternative A best maintains habitat diversity in the Long Gulch area. Grassland and timber burning treatments most represent processes which would maintain and mimic natural structural diversity. Alternative F most resembles natural patch distribution. Road closures are critical in order to maintain habitat characteristics being created. A mitigation consideration would be to employ strategies of different alternatives in a combination which maintains wildlife habitat diversity and characteristics over time. This would be accomplished by treating a large portion of the area, treating with a mosaic of prescriptions and reducing the effects of funneling caused by roads.

No alternative creates the large patch size that would have occurred in the cool/moist forested types under natural processes. Although commercial thinning and timber burning along the grassland/timber edge mimic historical processes, intrusion into otherwise closed canopy forests does produce a fragmentation effect.

5. Fragmentation

Some natural disturbance processes generally affect large areas or landscapes. This is especially true of fire which is probably the major disturbance process of the forests of the area. Analysis of historical fire patterns indicates that fires were on a watershed scale for most forest types of the area. This large scale of disturbance created watersheds which are now in similar forest successional stages.

Small scale treatments may fragment landscapes to a scale at which they did not normally occur. Future treatments are then also fragmented as they must be fit between existing treatments. Once a forest becomes fragmented it is difficult to reverse that effect.

In general, most treatment areas are smaller than the scale of disturbance which occurred naturally. This was a conscious decision which was made to reduce effects to other resources in the area. Natural disturbance sizes are not without negative consequences. The objective was to manage treatment areas at a scale which reflects a landscape but also minimizes disturbance to other resources by managing for smaller landscape scale disturbance.

Alternative D treats stands which have high economic return. It has the most small treatment areas and has the smallest average size treatment. It is the alternative which least addresses concerns for fragmentation.

Alternative E is restricted to no entry in roadless areas. To attain the target acres all activity would occur in roaded portions of the area. This concentration of activity creates large areas of similar successional stages. The roadless areas would be managed with effects similar to the No Action alternative. Roaded areas would generally be converted to early successional stages. If future entries continued this strategy of concentrated areas of activity large continuous portions of the implementation area would be managed in similar seral stages. This concentration of activity is conducive to change at a landscape scale and most reduces forest fragmentation in that large continuous areas will be managed in similar seral stages.

6. Old Growth

The direct effects on old growth are it's removal or modification, or the removal or modification of adjacent stands which may be used as movement corridors between existing old growth stands.

Harvesting of large diameter trees in stands that meet the criteria for old growth results in a decrease in old growth acres within the Implementation Area. Within managed ares, decreases in old growth have occurred since the 1970's. Recruitment of stands into old growth character occurs at a much lower rate so that within the managed lands of the Implementation Area the acres of old growth has been reduced and is at the lower range of historic variation.

Due to the low percent of functional old growth any alternative that further reduces the acres of this forest type could result in a short term reduction of populations of old growth associated species. The lower elevation old growth, that serves as wintering areas for nongame and game species is at the low end of the range of natural variation and, therefore, provides minimal amounts of this habitat. Until additional old growth is restored a short term reduction in numbers and types of wildlife species dependent upon this low elevation old growth could occur. At best, current populations might be maintained.

Within the warm, dry old growth habitats, fire suppression has resulted in an increase of conifer undergrowth causing much denser stands with closed canopies. These forests have developed unnatural stand structures due to fire control. The treatment of these forests moves them more in balance with the conditions with which they evolved. This makes the forest more sustainable. This modification also restores the niche in which plants and animals of this forest type evolved.

The following table displays the direct effects to old growth by the action alternatives by habitat type groupings. These groupings reflect the warm and dry forests of ELU 4, the cool and moist forests of ELU 4, and ELU 2.

TABLE IV-2
ACRES OF EXISTING OLD GROWTH TREATED BY ALTERNATIVE

HABITAT TYPE GROUPS	EXISITNG OLD GROWTH ACRES	ALT A	ALT B	ALT C	ALT D	ALT E	ALT F
H.T.Groups 1&2-Warm/Dry ELU 4	451	78	0	47	43	77	108
H.T.Groups 3&4-Cool/Moist ELU 4	547	69	0	0	70	106	118
H.T.Groups 5-10-ELU 2	462	27	0	0	0	0	0
Total Acres Old Growth Removed		96	0	0	70	106	118
Total Acres Old Growth Retained After Treatment		1364	1460	1460	1390	1354	1342

The treatment of old growth in habitat type groups 1 and 2 on the warm/dry sites of ELU 4 will not diminish its effectiveness, but will increase its sustainability. Manipulation of old growth within other habitat type groups will diminish or eliminate this resource.

Existing old growth could be affected if roads allow firewood gatherers access to the stand. By managing the regeneration harvest prescriptions with stand reserves and individual tree reserves the creation of future old growth conditions will be favored within treatment areas.

The percentage of old growth remaining in third order drainages after implementation of each alternative was estimated. The summary of that analysis are displayed in Table IV-3 on the following page.

TABLE IV-3
PERCENT OF OLD GROWTH REMAINING IN WATERSHEDS

WATERSHED (NF LANDS)	EXISTING	ALT. A	ALT. B	ALT. C	ALT. D	ALT. E	ALT. F
Lambing/Priest	0.9	0.8	0.9	0.9	0.7	0.5	0.8
Benton	6.9	6.8	6.9	6.9	6.8	6.6	5.5
Slough Ck.	15.0	15.0	15.0	15.0	12.8	12.4	13.8
Bridge	4.5	4.4	4.5	4.5	4.4	4.1	4.4
Mule/Atlanta	8.4	7.9	8.4	8.4	8.4	8.4	8.4
Beaver Ck.	2.6	2.1	2.6	2.6	2.2	2.3	1.9
Rubison/Moonshine	2.9	2.9	2.9	2.9	2.9	2.9	2.9

*Does not include treatments in habitat type groups 1 and 2 as treatments in these types will not affect their old growth character.

Alternative F removes the greatest amount of old growth forest from the implementation area. Alternatives A and D are nearly equal in their total effect in removing old growth from the area, and generally affect the same watersheds. Alternatives B and C do not remove old growth forests from the Implementation Area.

Alternative A, D, E and F harvest old growth forests from watersheds which are already below the Forest Plan minimum of five percent old growth per third order drainage.

Roading is a negative effect for old growth forests because it allows firewood gathers access to the forest. Large old snags which are a valuable habitat component in these forests may be removed as firewood. The following table is an estimate of the acres of old growth accessible to firewood gathers by alternative.

TABLE IV-4
ACRES OF OLD GROWTH ACCESSIBLE TO FIREWOOD GATHERING

ALTERNATIVE	A	B	C	D	E	F
ACRES	61	28	28	54	32	28

E. Effects of the No-Action Alternative

Current management would continue under the no-action alternative. Fires would be suppressed and no forests would be harvested. Vegetation would continue to advance successionally.

The cool/moist forest types continue to progress towards climax forest conditions. Tolerant species would be favored. Seral species would find stand conditions less favorable and would eventually succumb to old age or pathogens. The death of a major stand component would lead to large increases in fuel loads. With an eventual fire, forests would burn at high intensities and with a high resistance to control. If fire is eliminated as a stand replacement agent another mortality factor will fill that void (such as insect or disease outbreaks). Forest ecosystems are often less adapted to this "new" mortality factor which may produce greater change within the forest's structure and function than the more "common" mortality factor. This would appear to be the case for the warm and dry forests of the implementation area which are, in some cases, experiencing heavy mortality from secondary mortality factors such as intertree competition and western spruce budworm.

Selection of the No-Action Alternative would result in no man caused change in the forest ecosystem for the present planning period. Forests would continue to age and develop similar seral stages and stand conditions. Consequently, they would become more susceptible to extensive mortality from pathogens and wildfire. This would lead to eventual larger scale change on the forest landscape than is proposed with any of the action alternatives. In effect, the No Action Alternative manages the forest landscape at a level with greater oscillations in age class distribution and stand structure than do any of the action alternatives. Deferring active management of the area will not preclude major changes in the forest landscape over time.

Where crown fires (lethal) occur in the warm/dry forests of ELU 4 the opportunity to restore old growth habitat typical of these sites under natural conditions would be lost. Also, on the cooler, moister sites the potential for stand replacing fires would continue to increase even where a combination of lethal and nonlethal fires may have historically influenced the site. The potential for severely burned areas would increase due to extreme fuel buildups on the ground. Fuel continuity would continue to increase which would encourage more extensive fires.

F. Cumulative Effects

Large expanses of mature coniferous forest and reduction of old growth habitats are examples of the decline in habitat diversity. In some areas, old growth has also been impacted by roads through the removal of snags for firewood, resulting in insufficient quality and quantity of snags for cavity dependant species. Within the Implementation Area this lack of sufficient habitat is generally in the lower elevations and along the accessible riparian areas. Fire suppression has also had a negative impact on the warm/dry Douglas-fir (group 1) old growth. Fire suppression has led to an increase in understory conifer growth, changing the open savannah to a closed forest. This change has resulted in these old growth stands becoming unsuitable for species requiring open grown old growth. As habitat quality declines, and eventually becomes unsuitable for associated species, these species will cease to utilize the analysis area, lowering the overall biological diversity.

6. FISHERIES

A. Introduction

Effects to fisheries resources are discussed in relation to forest management activities involving road construction, timber harvest and burning on sediment yields in a watershed and their effect on the flow regimes and salmonid habitats. The effects on salmonid spawning and rearing habitat will vary according to stream morphology, landtype associations, amount and intensity of vegetation treatments, road construction, and existing conditions.

The regionally accepted R1/R4 Sediment Model (Cline et al., 1981) was used in conjunction with the FishSed Model (Stowell et al., 1983) in estimating how spawning habitat and salmonid embryo survival would likely respond to projected increases in sediment yield. Modeling results were also based on the WRENSS (USDA Forest Service, 180) and WATSED (USDA Forest Service, 1992) to measure the effect activities may have on fish habitat.

Quantitative modeling procedures discussed above were applied only to watershed units which have perennial stream reaches occupied by trout. Watershed units 1701A (Vermont Creek), 1704D (Atlanta Creek), and 1703 (Slough/Elk Creek) were prioritized for substrate sampling as part of overall forest-wide fisheries monitoring. Site specific spawning and rearing conditions have not been quantified for watershed unit 1704C (Pickfoot Creek). Therefore, effects of proposed activities on fish habitat were evaluated in a qualitative fashion.

All modeling results are displayed in table format and are located in the Project File.

B. Effects Common to All Action Alternatives

With the exception of long term risks associated with Alternative B (no-action), no changes to stream channel morphology and associated fish cover components is expected for the various action alternatives. The most common and direct effect associated with the proposed activities relates to increases in the concentration of fines (< 0.25 inch in diameter) from accelerated erosion and deposition of sediment into trout spawning and rearing habitat.

Fish habitat in Elk and Slough Creek is likely to remain unchanged under all action alternatives; conditions under Alternatives D and E showed only slight departure from current sediment levels. Fine sediment levels in trout spawning habitat are expected to increase in all action alternatives for Atlanta and Vermont Creek. Sedimentation will vary according to extent and placement of new roads, prescribed fire and timber harvest units. In contrast to Atlanta Creek, existing and projected peak (first year) sediment levels for the various alternatives for Vermont Creek are very high and show little variation (51.0 to 51.9%). The percent increase over baseline conditions in the worse case scenario, Alternative E, would be less than two percent. Hence, there would be little direct effect on existing sediment levels for Vermont Creek from all action alternatives.

Little or no drop in survival to emergence of salmonid embryos is expected for all action alternatives in Elk and Slough Creek. There will be no measurable declines in rainbow trout reproductive success for Vermont Creek. However, current heavy concentrations of fines (51%) in spawning habitat in Vermont Creek have already reduced survival and emergence rates for rainbow embryos to less than 0.1 percent. Any additional fine sediment intrusion into the gravel matrix of spawning habitat could further suppress, or eliminate, their survival. Temporary spring and early summer surface flows in Benton Gulch, however, provide a migration route into or out of lower Vermont Creek which may explain their persistence in this lower sediment-laden reach.

Although the reproductive potential of spawning habitat is expected to decline for all action alternatives in Atlanta Creek and only marginally in Vermont Creek, there is likely to be little or no effect upon the adult life stages of salmonids in the Implementation Area. Fish harvest is not expected to occur as streams in the area do not draw much fishing interest. Therefore, recruitment of younger fish to larger size classes should maintain current population levels.

Similar results are expected in Pickfoot Creek which has no substrate data available to evaluate quantitatively. The potential for increased sediment delivery will be a function of ground disturbance activities associated with vegetation management and road construction. Thus, alternatives with more intense ground disturbance generally will have higher sediment delivery potential to Pickfoot Creek than alternatives with little or no ground disturbance.

An indirect effect common to all action alternatives as a result of increased sediment deposition in Atlanta Creek is a shift in the differential embryonic survival rates between cutthroat and brook trout. This shift will affect cutthroat trout production more than brook trout production, especially the first year after implementation of project activities in the drainage. For instance, brook trout egg survival rates are projected to decline seven percent (56% to 52.2%) compared to a 20 percent (23% to 18.5%) reduction for cutthroat egg survival rates in Alternative A. This is one of the mechanisms believed responsible for the competitive displacement of cutthroat trout by brook trout where these species both occur in lower gradient stream reaches.

Over time, increased sediment delivery will moderate in response to revegetation of disturbed areas and recovery of fish habitat will occur given sufficient time for the streams to export accumulated fines from their gravel beds. In the long term, fish habitat is expected to improve or stabilize.

Potential changes in the magnitude and frequency/timing of flows in fishery streams are expected to be scant or undetectible. For example, worse-case scenarios for Vermont Creek (Alternative E) and Atlanta Creek (Alternative A) project increased peak flows of only two and three percent. Although the peak runoff period may occur less than a week earlier in the spring, such small changes should have negligible effects upon fish habitat and populations in the Implementation Area.

C. Direct and Indirect Effects by Alternative

1. Alternative A

Modeling results indicate that implementation of Alternative A may elevate fine sediment concentrations in spawning habitat for Atlanta Creek nine percent over existing levels in the first year following project activities. Cutthroat embryo survival and emergence would decline approximately 20 percent versus seven percent for brook trout in year one, subsequently providing brook trout a temporary advantage in production from existing levels. Recovery to current conditions would result after six years from the conclusion of management activities. Sediment increases in Vermont Creek would be less than one percent. A prescribed grass burn unit in the extreme lower reaches of Pickfoot Creek may result in incidental sediment delivery to the channel as a function of intense storm activity. However, any increase is expected to result in negligible changes in trout spawning gravels.

2. Alternative B

Direct effects for the no action alternative would be null for fishery streams in the Implementation Area. Fish habitat conditions would likely remain unchanged from their current state in the short term. However, indirect effects tied to past fire suppression efforts coupled with extremes in weather patterns could subject fisheries streams to radical changes in channel morphology and floodplain hydrology (refer to effects under water resource section). Under this scenario, fish habitat would likely experience degrading conditions as a consequence of high intensity fire/flood events.

3. Alternative C

Modeling results indicate that Alternative C alone may result in elevating fine sediment concentrations in spawning substrates for Atlanta Creek four percent above existing levels in the near term. Cutthroat embryo survival and emergence would decline nine percent (23% to 21%) versus three percent (56% to 54.3%) for brook trout, giving brook trout a slight advantage in production capabilities. Recovery to current conditions would occur within five years after the end of management activities. Sediment delivery to Vermont Creek would be negligible (<0.1%). With no activities scheduled directly in the Pickfoot drainage, fish habitat conditions would remain unchanged.

4. Alternative D

Alternative D has the greatest potential to affect trout spawning habitat and fish production in the near term. Increases in sediment delivered to Elk and Slough Creeks would equate to less than a two percent elevation in fines in spawning substrates. These negligible increases would not have an adverse effect on fish or fish habitat. In Atlanta Creek, modeling results show Alternative D may result in an increase of sediment in spawning habitat 12 percent above current levels the first year following implementation of activities. Cutthroat embryo survival rates are projected to decline 25 percent (23% to 17%) versus nine percent (56% to 51%) for brook trout in year one, giving the brook trout a temporary increased competitive edge in production capabilities. Recovery to existing spawning conditions would occur following six years from the conclusion of management activities. The clearcut units near the top of the Pickfoot watershed may result in incidental sediment delivery to the channel, however, strict adherence to SMZ rules as they apply to forest practices should mitigate potential effects from harvest units.

Mitigation measures to minimize the short term effect on cutthroat habitat in Atlanta Creek for this alternative include strong adherence to SMZs and a staggered timeframe for implementing the various prescriptive treatments rather than all in a single year. Spreading the treatments would reduce the amount of sediment delivered to Atlanta Creek in a single year. This would be effective at reducing the risks to cutthroat associated with the survival advantage given to the brook trout.

5. Alternative E

Except for Vermont Creek, Alternatives E and F will be the least impactive to Atlanta Creek in terms of sediment intrusion into spawning habitat. Fine sediments in spawning substrates for Atlanta Creek will elevate three percentage points from existing conditions in year one. As a result, cutthroat embryo survival is expected to decline seven percent versus two percent for brook trout, giving brook trout a small competitive edge in production capabilities. Recovery to current conditions will occur in three years. Fine sediment levels in Vermont Creek are expected to rise an additional two percent above current extreme conditions in critical spawning habitat. Because of extremely depressed rainbow trout production capabilities, any additional sediment loading is expected to further suppress or eliminate the local population from this stream reach.

6. Alternative F

Alternative F will be the least impactive in terms of sediment production in Atlanta Creek. The model predicts fine sediment levels in trout spawning substrates to increase less than two percent in Atlanta Creek. Differential embryonic survival rates are expected to decline three percent for cutthroat versus one percent for brook trout.

D. Effects to Sensitive Fish Species

As referred to in the fisheries section of Chapter III, pure westslope cutthroat trout have not been confirmed in any of the analysis area streams. Cutthroats were observed in Slough Creek but due to their extremely small numbers there (three), the decision to collect specimens for genetic testing had to be waived for this small stream.

Cutthroat trout habitat in Slough Creek is predicted to undergo little or no change as a consequence of all alternatives although no action may subject the watershed to higher risks from extreme environmental fluctuations (wildfire, floods) than would be the case under all the action alternatives.

E. Cumulative Effects

When combined with past, present and reasonably foreseeable actions (placer mining, additional water yields, timber harvest and livestock grazing) on both public and private lands, the cumulative impact of the proposed actions will result in short term downward pressure on fish productivity in Atlanta and Vermont Creeks. Fish habitat potential would likely remain static under the no-action alternative.

With the implementation of revised Allotment Management Plans, the foreseeable future should result in improved riparian conditions to the benefit of the fisheries resource. The effort to move towards desired conditions should permit fish habitat and fish populations to improve over time, notwithstanding the risks associated with extreme natural environmental impacts (wildfires and floods).

8. WILDLIFE

A. Introduction

Effects to the wildlife resource are discussed in relation to specific species as described in Chapter III. This analysis assumed that if conditions on the landscape are similar to those that the native flora and fauna evolved under and are adapted to, then the full complement of species is sustained over time.
The following effects analysis serves as the biological assessment. This biological evaluation addresses the possible effects to endangered, threatened, proposed and sensitive species that may occur in the project area.

B. Threatened and Endangered Species

Under provisions of the Endangered Species Act, Federal agencies are directed to seek to conserve endangered and threatened species and to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of their critical habitats. Whenever an action may affect a species listed or proposed for listing or its habitat, federal agencies must consult with the U.S. Fish and Wildlife Service (or National Marine Fisheries Service for marine species).

As discussed in Chapter III, the Gray Wolf falls within the Yellowstone Non-essential Experimental Population Area and is treated as a species which has been proposed to list with no identification of critical habitat in the area.

1. Bald Eagle

The bald eagle exhibits potential to reside within the Implementation Area during portions of the year. Previous discussions relative to wildlife habitats are applicable for the bald eagle. Managing within the "natural range of variation" is generally considered to be a benefit to maintaining and increasing threatened and endangered species habitat.

a. Effects Common to All Alternatives

By achieving the desired habitat conditions on treated areas nest resources found in the uplands may increase bald eagle use in the area. Currently, most use occurs on low elevation private lands in the winter. No alternative reduces the current available food resource.

2. Gray Wolf

The gray wolf presents a reasonably foreseeable potential to use the area should transient movements occur between the newly transplanted Yellowstone population and the established Glacier population.

Theil (1985) and Jensen et.al. (1986) reported that wolf populations cannot sustain themselves when open road densities exceed 0.97 miles/sq. mile. Theil further recommended that wolf management plans limit road densities to less than 0.88 miles / sq.mile. However, Mech (1989) reported that areas having road densities greater than 0.97 miles / sq.mile can still support wolves if it is adjacent to an extensive roadless area. By these definitions, it is conceivable that the Implementation Area could support a small population of wolves at some point.

Alternatives C,D,E, and F move the Implementation Area road densities within the above stated parameters. While only alternatives B and E do not enter roadless areas to any significant degree.

• Management guidelines specified within the Wolf Recovery Plan will be followed should any wolves begin to frequent the area.

C. Sensitive Wildlife Species

Effects to sensitive species that may reside in the Implementation Area or travel through it were analyzed. General effects are described followed by mitigation measures, if needed. These mitigations are interim management strategies (IMS) recommended throughout Region 1 in order to maintain sensitive wildlife species. IMS guidelines will be applied where biologically feasible on the landscape. IMS are regional guides, some of which cannot be attained within the vegetation types in the Implementation Area. A discussion of which IMS guides may be attained is in the Project File.

1. Flammulated Owl

The limiting factors for this species are nesting habitat and possibly feeding areas. Snags are limited in some of the lower elevations due to access by roads and the associated removal of snags for fuelwood. Feeding habitat may be limited due to the secondary growth associated with the lack of fire in these habitats. Effects described within the old growth section under ELU 4 dry savannah type apply directly to the flammulated owl.

TABLE IV-5
EFFECTS OF ALTERNATIVES ON POTENTIAL FLAMMULATED OWL HABITAT

Alternatives	A	B	C	D	E	F
Group 1 OG acres forested	78	0	47	43	77	108

Flammulated owl utilize the warm, dry old growth, warm and dry forests as a part of their habitat. Treatments in these forests will not affect their old growth character because the stands will be thinned from below and the large old growth trees will be retained. This will stabilize the forest type by reducing the severity of western spruce budworm outbreaks and reducing the potential for crown fires. Vegetative treatments in this forest type may be beneficial for the flammulated owl as supported by literature cited in Chapter III.

All alternatives maintain old growth patches and grasslands within the historical patch sizes and distribution. This will result in most of the areas being suitable for foraging and denning habitat. Areas that are outside the desirable patch size may not be preferred habitat but will be suitable as secondary habitat. Alternatives that close roads within old growth management areas will also promote maintenance of existing and future snags.

2. Black-backed Woodpecker (BBWP)

The proposed action and associated alternatives could impact current BBWP populations by removing dead and dying forests as well as increasing access for woodcutters. The road closures proposed in the alternatives and compliance with the Forest Plan snag retention guidelines should assure that effects are not measurable. Alternatives C-F, because of the increased closures of existing roads could result in small enhancements of BBWP habitat.

All alternatives incorporate design features that satisfy the following Interim Management Strategy (IMS) guidelines that have been developed to maintain black-backed woodpecker habitats.

• Follow snag retention standards and guidelines in Forest Plan and habitat attributes for harvest areas.

- Depending on the habitat type, various amounts of snags will be left for current and future use in treatment areas, all greater than Forest Plan Standards.

- Implement road closures if necessary to protect snags from firewood cutting.

- Follow old growth and mature retention standards in the Forest Plan.

- Retain snags as dispersed clumps rather than as isolated individuals to meet nesting and feeding requirements (Raphael and White 1986).

- Leave patches of unburned throughout burned forest. Patches and trees will be scattered and left clumpy to mimic historical patch dynamics.

- Where occupied black-backed woodpecker nest cavities are known to exist, delay logging operations until mid to late summer (starting operations in July).

The following IMS guideline may not be feasible within the landscapes of the Implementation Area.

- To support maximum bird densities on burned forests, maintain 423 suitable soft snags (>15 years) per 100 acres. It takes four hard snags to produce one soft snag. On unburned forests 342 suitable snags (1/3 hard) were required per 100 acres.

This IMS guideline recommends approximately 2000 snags of various types be present within a 100 acre area. This may or may not be possible within the forest landscapes involved. In cool/moist forests which have mixed or lethal fire processes, snags are a periodic resource on the landscape. They are abundant following disturbance, then decline in numbers until at a mid seral phase they may be absent. As seral components succumb to pathogens, snags again increase in abundance. In warm/dry forests which undergo non-lethal underburns snags are a more continuous component on the landscape. However, tree densities on some of these savannah forests may not contain enough snags to generate the IMS recommended density.

3. Lynx

None of the action alternatives harvest or penetrate the large block of cover within the potential habitat associated with Lynx. Creating edge and adding early successional stages will increase the food supply (see chapter 3 Lynx discussion). Closing off existing and new access routes to reduce funneling will likely have the greatest positive impact for this species. (See the effect writeup under pine marten for a discussion of alternatives and road closures relative to access penetration.)

Mitigation Measures

- Regarding trapping vulnerability and displacement as a result of human presence, winter monitoring as to the effectiveness of road/area closures resulting from the chosen alternative will be done for 5 years after completion of vegetation treatments.

4. Boreal Owl

Limiting factors for the boreal owl within the Implementation Area include snags with cavities. Within the area the upper elevation forests are developing into the ages where snags will begin to become plentiful again based on the succession of the stand. None of the alternatives should create any measurable change in boreal owl habitat or populations.

The following IMS guidelines have been adequately incorporated into the design of each of the action alternatives.

- Provide for cavity nesting habitat within 1/2 mile of spruce-fir life zones.

- In moderately productive spruce/fir sites utilize group selections or irregular shelterwood treatments. Maintain 40 percent or 5,000 acres in mature and older age classes and 20 percent in an immature age class.

- Timber management that is compatible with abundant small mammal populations should be practiced in boreal owl habitat.

- Follow snag retention guidelines in the Forest Plan. Retain snags or replacement snags that are >12 inches dbh.

The following IMS guidelines may not be feasible within the landscape of the Implementation Area.

- These prescriptions are intended to be applied over 5,000 acre landscape area, in productive boreal habitat such as 50 percent spruce/fir and Douglas-fir use irregular shelterwood cuts for even-aged management. It is preferred that stand rotation be extended to 1-500 years if managing for even-aged stands. When managing for uneven-aged stands in productive sites apply group selections of no more than 3/4 acres in size. At the end of the first entry, at least 80 percent of the site (5,000 acres) should still be forested. At the end of 15 years, at least 60 percent of the site is forested. Overall, 30 percent of the site should be in mature and older stand classes. Another 20 percent of the site should be managed as immature sawtimber.

- In less productive sites such as dry subalpine fir and lodgepole pine stands, utilize patch clear cuts, shelterwood cuts or irregular shelterwood harvesting methods. Maintain at least 50 percent of the area as mature and older age stands and 20 percent of the area in immature status.

These IMS guidelines recommend extending the rotation of these cool moist forest to 500 years and managing some of these forests with unevenaged management of 3/4 acre group selection harvest or patch clearcuts.

The Big Belts Landscape Analysis does not support this form of management for these forests. The Belts analysis found that these cool/moist forests were subject to infrequent, but extensive fires. The analysis also projected a maximum natural forest age of approximately 250 years. Managing the cool/wet forests of the Implementation Area with the above IMS guidelines would not be within the range of tolerance which the ecosystem functions.

5. Wolverine

The effects of the proposed action and the alternatives on wolverines are similar to those of the pine marten. Because wolverines have generalist food habitats, vegetation treatments that maintain or enhance diversity of the prey base are likely to enhance wolverine habitat. The greatest impacts result from human access to suitable habitat. Alternatives C and F are the only alternatives that reduce the funneling along existing routes and creates no new human corridors.

Mitigation Measures

- Monitoring will take place as to the effectiveness of road/are closures upon reducing human caused displacement as a result of any vegetation treatments for five years following project completion.

D. MANAGEMENT INDICATOR SPECIES

Effects to MIS species are considered to be the same or similar for the species they are representative of, in theory. For example, the effects discussed for elk can be assumed to be the same or similar to those of other commonly hunted species such as mule deer.

1. Elk

Effects to elk are discussed in relation to elk vulnerability. Habitat components most affecting elk vulnerability are open road densities, hiding cover, and security.

TABLE IV-6
EFFECTS OF ALTERNATIVES ON ELK VULNERABILITY

Alternatives	A	B	C	D	E	F
ORD (MI/MI²)[1]	.96	.98	.59	.83	.72	.72
MILES OPEN ROAD[1]	79	81	37.3	45.4	38.3	45.7
THOMAS-BENTON HERD UNIT						
% HIDING COVER	34%	36%	35%	34%	34%	35%
% SECURITY	31%	31%	36%	27%	33%	31%
IMPLEMENTATION AREA						
% HIDING COVER	24%	22%	39%	22%	34%	29%
% SECURITY	24%	21%	36%	20%	31%	28%

1. ORD during hunting season , seasonal restrictions.

A. Direct and Indirect Effects to Elk by Alternatives

All action alternatives reduce hiding cover by less than one to upwards of four percent. In addition, Alternatives A, C, D, E and F reduce the open road density from 0.98 miles per square mile to between 0.59 and 0.96 miles per square mile. These overall improvements from the existing condition still do not meet the Forest Plan standard for hiding cover and open road density during the hunting season. To meet this Forest Plan standard would require allowing no more than 8.3 miles of road to be open in the elk herd unit during hunting season.

According to the Helena National Forest Plan, thermal cover will be maintained at 25 percent within areas of winter range subject to hydrologic and other resource constraints. Within the Thomas-Benton Herd Unit and subsequently the Implementation area, 67 percent of the winter range is located on private land. Of the winter range located on public land, only 17 percent of it falls within thermal range parameters currently. As previously stated in chapter three, elk migrate to private lands during hunting season to escape hunting pressure. For the most part, they remain there to winter. Therefore, the thermal cover standard within the area is "subject to other resource constraints" and not realistically attainable regardless of the harvest proposals within the action alternatives.

Elk security was determined based on 250 acre patches of cover at least ½ mile from an open road during hunting season. From the perspective of elk security there is no difference in security effectiveness between roads that are being revegetated and recontoured or roads that are closed with a combination of slash, debris and earthen barriers. Both are designed to discourage funneling and travel. Roads closed with gates or barriers at the beginning, for either seasonal or yearlong closures are intended to stop vehicular travel. These types of road closures are less effective at stopping vehicular use. In addition, they allow for funneling of humans and livestock. The effects of funneling on elk include allowing greater concentrations of hunters into areas that would not normally exist without the road or trail, resulting in higher vulnerability to elk during the

hunting season. Roads funnel livestock into areas they would not normally go due to terrain and vegetation, this type of funneling occurs on summer ranges into wet areas. By funneling livestock in large concentrations into these mesic areas, elk are displaced from these key sites on summer ranges.

Although all action alternatives reduce potential security areas, Alternatives C and E increase security due to road closures. Alternative D reduces security (27%) to below the recommended threshold. Alternative A closes only two miles of roads and reduces some existing security but still maintains 31 percent for the herd unit in security. Effects to elk security areas for each action alternative are displayed on Figures IV-1 thru 5.

The Implementation Area only encompasses the northern half of the herd unit. Alternatives A, C, E and F increase security within this portion of the herd unit. Alternatives C, D, and E result in the largest patches of security in Beaver Creek. Alternative C, due to road closures and softer vegetation prescriptions is the only alternative that results in substantial security in Long Gulch. In Ohio Gulch, Alternatives C and E result in large blocks of security while Alternatives F, D, and A result in smaller blocks of security totaling fewer acres.

All alternatives maintain the integrity of the security in the Atlanta and Moose Creek drainages. A large patch of timber located on the southern portion of Atlanta Creek within winter range is maintained in Alternatives F, E, and C.

Hiding cover for the herd unit is currently 36 percent while the hiding cover for the Implementation Area is currently 22 percent. Estimates based on photo interpretations of private land indicate a lesser amount of cover, further reducing cover ratios for the entire range used by the elk.

The effectiveness of elk habitat is greatly diminished by human activity on roads. The Forest Plan has set a standard for allowable open roads for a given amount of hiding cover during the hunting season. No alternative meets this standard for the entire herd unit, nor is it ever likely to based on the vegetation potential of the northern portion of the herd unit. The Forest Plan standards are likely not realistically attainable for the herd unit or Implementation Area.

The security area method of rating elk habitat quality is influenced by open roads, accessibility and blocks of cover. All Alternatives, except Alternative D, maintain the recommended 30 percent within the herd unit. Within the Implementation Area only Alternatives E and F approach the 30 percent figure in the northern portion, with 29 percent and 28 percent security respectively.

Hiding cover and open road density figures do not reflect the increase in elk security caused by road closures proposed in alternatives for the northern portion of the herd unit. That area is the most important within the herd unit for maintaining security. That area, because of inherent openness is most influenced by roads and access. Closing of the ridge road and associated roads has the greatest influence on improving security.

Cumulative Effects

Cumulative Effects for elk are described in the Cumulative Effects section for wildlife.

Mitigation Measures

- Monitoring as to the effectiveness of road/area closures resulting from project implementation will be monitored for at least five years.

FIGURE IV-1 ALTERNATIVE A ELK SECURITY

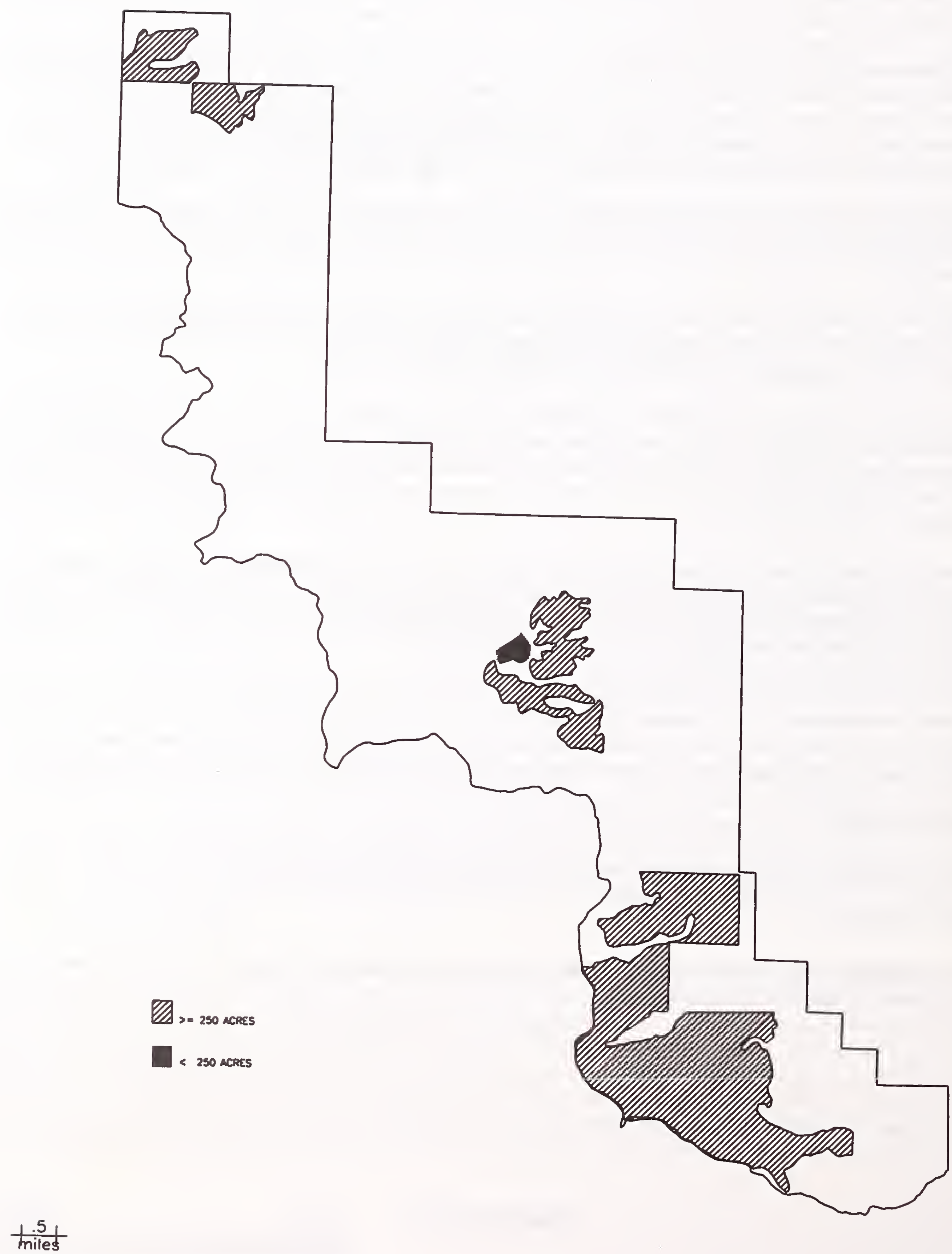


FIGURE IV-2 ALTERNATIVE C ELK SECURITY

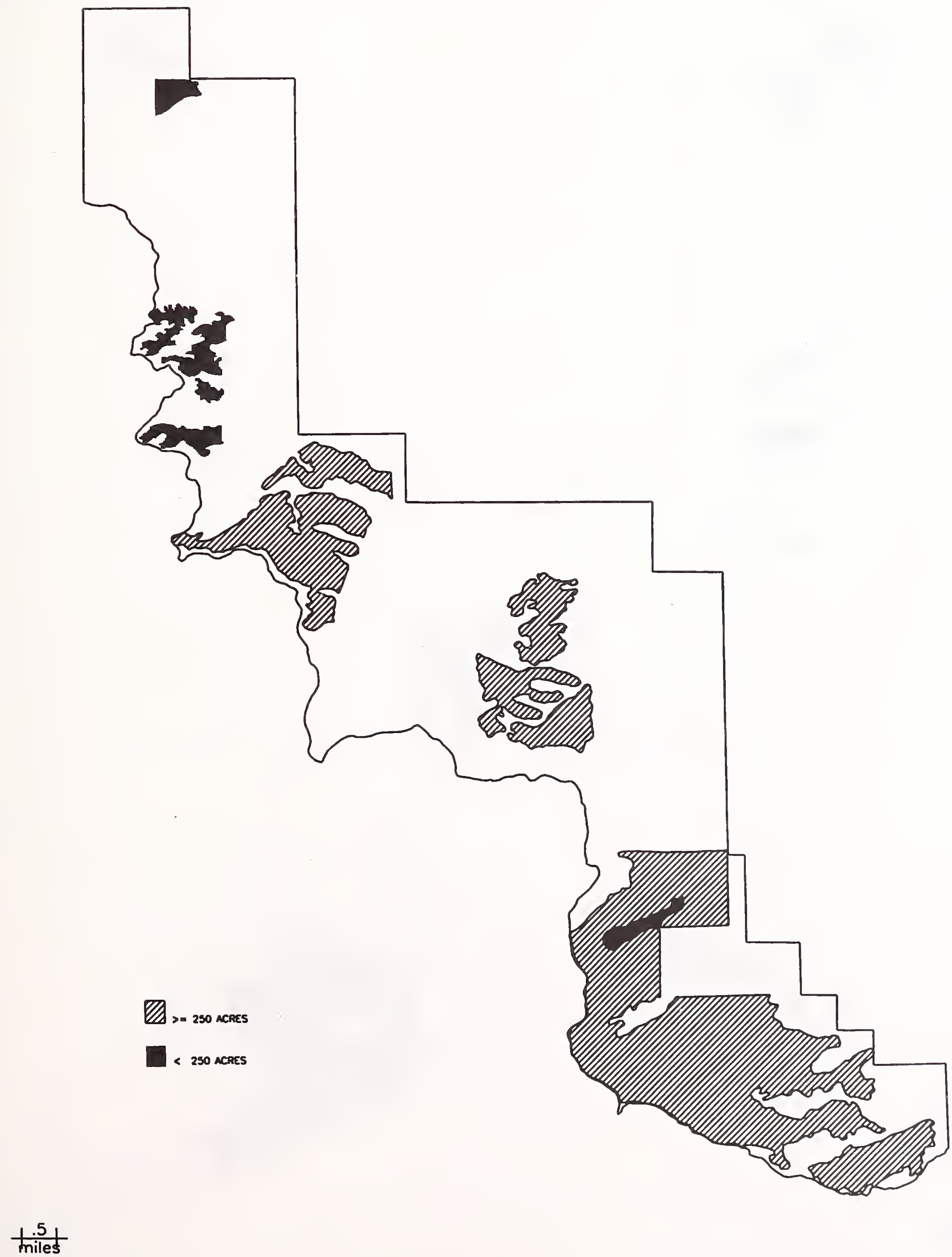
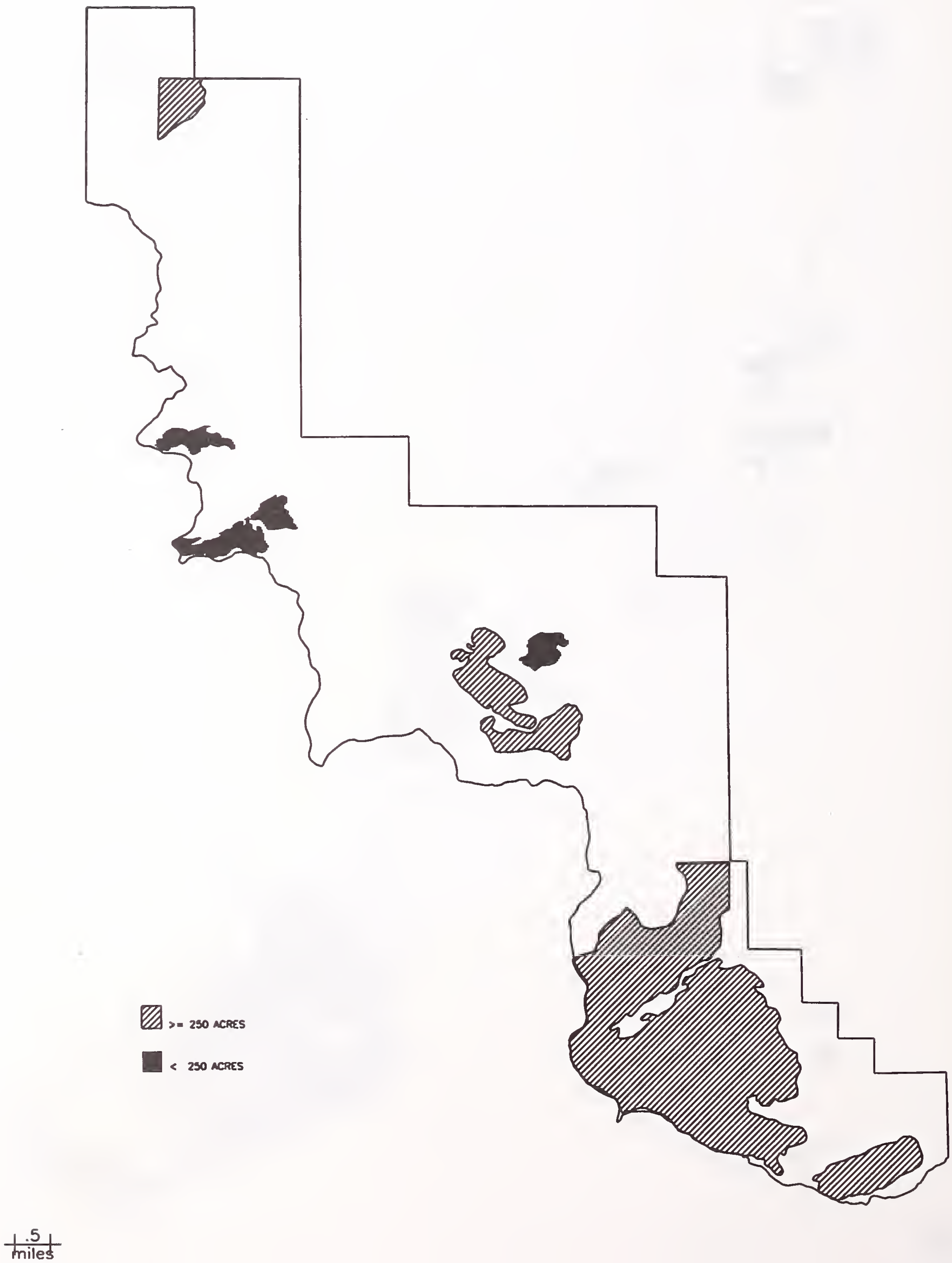


FIGURE IV-3 ALTERNATIVE D ELK SECURITY

FIGURE IV-4 ALTERNATIVE E ELK SECURITY

FIGURE IV-5 ALTERNATIVE F ELK SECURITY



2. Pine Marten

As stated previously, the pine marten is a management indicator species (MIS) for wildlife species requiring blocks of mature trees. The alternatives only impact one home range, which is centered around Boulder Baldy Mountain. Past management has continued to reduce this home range by eroding the edges and fragmenting the continuous cover. The Birch Creek basin home range area remains the same. In areas that are not being harvested, succession of coniferous forests will result in greater amounts of downfall providing for more denning and foraging opportunities. In addition, previously harvested areas that are adjacent to mature forest will begin to provide some limited foraging habitat.

A. Direct and Indirect Effects to Pine Marten

Alternatives A, C, and F reduce the Boulder Baldy home range by less that one percent of the area. This reduction occurs on the east side of the area. Alternative A closes ½ mile of road and Alternatives C and F close 2.7 miles of existing roads. These roads currently are closed October 15 to May 15. Although this does reduce the vulnerability to trapping, the roads do penetrate the area and potentially aid in the funneling of humans. These proposed road closures are intended to stop the funneling effect thereby reducing the vulnerability to trapping. Alternative C and F will maintain and enhance pine marten habitat through the reduction in funneling as well as some habitat alteration. This habitat alteration will displace use in the short term but will result in future denning and foraging sites.

Alternative B results in no eroding of the edges of the home range. In addition, roads also remain in place. Succession of mature forests will result in greater amounts of downfall providing for more denning and foraging opportunities.

Alternatives D and E result in the greatest eroding of the home range while not closing any roads. This approach continues to reduce amount and quality of the home range. Effects by alternative are diplayed in Table IV-7 on the following page.

B. Cumulative Effects

The numerical values provide a point of comparison between alternatives and show a decline in pine marten habitat. It is not a conclusive model in pine marten suitability. Over the last decade the southern portion of the Implementation Area has become more fragmented with roads and harvesting to become marginally suitable for pine marten. All action Alternatives continue to erode this area. These effects are added to the effects of previous actions that have resulted in a continued cumulative decline in pine marten habitat suitability. The pine marten is a management indicator species for species that require large blocks of continuous mature coniferous forest. Therefore it is also likely that similar species may be declining.

Mitigation Measures

- Trapping season monitoring will occur to determine the effectiveness of road/area closures resulting from project implementation.

TABLE IV-7
EFFECTS OF ALTERNATIVE ON PINE MARTEN HOME RANGE (HR)

ALTERNATIVES	A	B	C	D	E	F
HOME RANGE REDUCTION	97ac/1%	0/0	87ac/<1%	920ac/8%	168ac/2%	59ac/<1%
COMMENTS	Closes 1/2 mile of road w/in HR	No reduction in roads/No eroding of HR or penetration	Closes 2.7 miles of road	Large Chunk	Erodes small amount	Closes 2.7 miles of road.

3. Hairy Woodpecker

A. Direct and Indirect Effects

Alternatives A, D, E, and F would reduce hairy woodpecker habitat by one to two percent. Hairy woodpecker needs are not sensitive to disturbance or fragmentation. Because the hairy woodpecker can inhabit small stands with snags the proposed project does not have significant effects on this management indicator species in the short term. If Forest Plan snag guidelines are followed ample habitat will exist when regeneration reaches the pole through mature stage in other than lodgepole stands.

Alternatives B and C have no reduction of hairy woodpecker habitat resulting in no direct effects.

Alternative C closes existing and new roads which would protect newly created snag resources, resulting in a habitat improvement in the long term for Hairy Woodpeckers and other snag dependant species.

TABLE IV-8
EFFECTS OF ALTERNATIVES ON HAIRY WOODPECKER

ALTERNATIVES	A	B	C	D	E	F
ACRES SUITABLE	3439	3636	3572	3508	3471	3360
% SUITABLE	13%	14%	14%	13%	13%	12%

B. Cumulative Effects

The prescriptions in all of the action alternatives, though reducing total habitat, will increase snag resources dramatically over the long-term. As an additional measure, a portion of the remaining slash from each treatment will be piled at the bases of various trees along the perimeters and within leave strips to be burned for the creation of additional snags in a manner approximating natural snag creation. This will not only benefit the hairy woodpecker, but also a variety of primary cavity nesters with an additional source of snags.

The continued accelerated rate of harvest on adjacent private land will eventually eliminate it as suitable habitat.

4. Goshawk

Food and nesting sites have been determined to be the most limiting factors for goshawks. Within the portion of the Implementation Area that contains the goshawk territories, the vegetation based on the edge between the grassland and timber zones is considered highly diverse.

A. Effects Common to All Alternatives

Prescriptions developed during this analysis for the timber and grassland vegetation contain a variety of reserve and leave material of live and dead biomass that will provide for future diversity in this area. This diversity will continue to provide for prey species in the future for goshawks.

Harvesting within nest stands would cause short and long term displacement of the goshawk from that territory. Where harvesting occurs within the post fledgling areas short term displacement may occur due to activity. Long term displacement may occur due to changes in the vegetation causing a decline in prey species. Within the territory displacement may occur due to habitat changes resulting in prey species density changes. These birds are sensitive to disturbance around the nest site and during incubation and fledgling stages.

TABLE IV-9
EFFECTS OF ALTERNATIVES FOR GOSHAWK

ALTERNATIVES	A	B	C	D	E	F
ACRES NESTING Area A/B	70/0	70/93	0/46	40/58	70/93	70/93
ACRES POST FLEDGLING Area A/B	611/312	636/512	600/282	526/240	636/512	575/512
% of territory altered A/B	5%/13%	0/0	2%/12%	9%/3%	3%/0	7%/5%

B. Direct and Indirect Effects by Alternative

1. Alternative A

This Alternative harvests all of the nesting area identified for nest B. In addition, harvesting occurs in close proximity to nest area A that would in all likelihood also cause displacement. Within the entire territories, this Alternative harvests 13 percent of territory B and five percent of territory A. This alternative is likely to displace goshawks within the area on a long term basis.

2. Alternative B

No harvest occurs within either of the nest stands, the post fledgling area or the territory as a whole. Succession would continue, resulting in greater acres of forest in the mature condition as well as higher than endemic levels of insect activity. The goshawks would continue to exist in the area, nest and rear young until habitats changed enough as to not supply the needed amounts or type of prey. The time at which birds would cease to use the area is unknown. Because the forests in that area are very dynamic, in all likelihood birds under the no management option would cease to use the area in 15-20 years.

3. Alternative C and D

These alternatives significantly impact both nest sites causing abandonment of the area. Because of the probability of nest abandonment effects to the territories are irrelevant for the short term. Long range, the territories would proceed with succession so that in the future (+60 yrs) the area would again be suitable.

4. Alternative E

No harvest occurs within either of the nest stands or within the post fledgling area. The proposed treatments within the territories include timber and grass burning that would in all likelihood maintain the diversity of the ecotone that exists.

5. Alternative F

No harvest occurs within either of the nest stands and a small amount of harvest within the post fledgling area of territory A that would not likely cause displacement. The amount of harvest in both territories, in conjunction with the proposed burning will maintain diversity over the area both short term and long term.

Displacement of the goshawk from this area, either short or long term, would result in a decrease in diversity in the wildlife in the area over time. Displacement could be caused by activity in or near the nest as well as changes in the vegetation that would result in changes in the prey base. Changes in the habitats of the territories greater than 10 percent is likely to cause the goshawks to abandon the area. Only Alternatives A and F maintain the existing nest stands and continue to promote diversity of vegetation.

6. Cumulative Effects

The high level of harvest occurring on private land has potentially eliminated it as potential goshawk habitat for many years. The mitigation measures listed below will ensure that existing goshawk habitat will be sustained over the long term. Based upon observations of active nest sites on the Beaverhead and Deerlodge National Forests, the thin from below prescriptions with the generation of small openings will potentially expand goshawk habitat over the long term. Large clearcut prescriptions with 25% leave strips will remove potential nest sites but potentially augment forage areas. There is the increased potential for predation upon birds that may use harvested areas. If an area within the Implementation area is determined to be exceptional goshawk habitat, then the mitigation measures listed below will used to ensure sustainable, long term habitat availability. Should the no action alternative be implemented, goshawk habitat within the Big Belts will decline until habitat suitability is restored by natural processes.

Mitigation Measures

- The nest stands will not be entered.
- Forest canopy will be maintained at a minimum of 40% within the post fledgling areas.
- Biologist will direct marking and aid in development of marking prescription within the post-fledgling areas.
- Harvest will be limited to October 1 to February 28 entry dates within the post-fledgling area of a nest with verified occupancy.
- Surveys of each unit and areas immediately adjacent will be done prior to harvest.

E. Forest Songbirds

1. Direct and Indirect Effects

Dependent upon which songbird is analyzed, all alternatives present potential to adversely effect one species or another. The No Action Alternative (B) threatens interior songbirds by allowing the increase of competitive edge songbirds such as the robin. All action alternatives which enter ELU 2 have the potential of reducing forest interior songbird habitat to some degree. The thin from below prescriptions within ELU 4 have the

potential to benefit those species most evolved to the conifer savannah while impacting those forest interior species which have shifted their distribution to these areas due to changes in structure resulting from the exclusion of fire. In all of the action alternatives, forest interior songbirds such as the brown creeper and red-breasted nuthatch will face an initial reduction of available habitat to the benefit of species such as the western tanager and american robin. However, in the long-term, forest songbirds should benefit from the increased variety of available habitats and increased snag density for secondary cavity nesters.

2. Cumulative Effects for Forest Songbirds

Cumulative effects for songbirds was separated from the overall discussion of effects due to special circumstances. More than any other group of species, this group has been most impacted by the extensive harvesting taking place on adjacent private lands. Due to the local shortage of timber supply, timber prices have become high enough to induce private land owners to harvest timber. In most cases the level of harvest is extensive. A large percentage of available habitats for forest songbirds has been decimated in several of these areas. This impacts all songbirds and leaves a great opportunity for the expansion of the brown-headed cowbird into new areas. The total effect upon forest songbirds is then magnified to higher level. This effect places a level of urgency upon the maintenance of a variety of optimal habitats on public land. If we have a greater diversity of habitats on the National Forest, this should attract a greater diversity of songbird species to the area. Thus, the effects of a nest parasite such as the cowbird could be dispersed amongst many species rather than tremendously impacting a few species. The National Forest has no control over the effects of timber management on private land, but may be able to mitigate for them by using burning and harvest in a sensitive manner. The analogy that comes to mind is using the same tool to build next to an area where it is being used to destroy.

F. General Cumulative Effects

The continuous, past, present, and reasonably foreseeable actions in the Implementation Area as well as actions with in the Thomas Benton Herd unit are listed in the Project File.

Past activities have resulted in an increase in roads as well as a reduction in cover. These two actions have increased fragmentation. This increase in fragmentation has resulted in a decline of quality to specific habitats resulting ultimately in a decline of wildlife species associated with those habitats.

Roads have increased and dispersed humans and livestock into areas that would not have been impacted without the roads. Reduction in cover coupled with the increase in access has resulted in elk being extremely vulnerable during the hunting season, thus the majority of the herd moves to private land. Additional vulnerability of species that are hunted and trapped has also occurred with this increase in access.

The greatest impact from the proposed vegetation manipulation is the addition of the roads (which is mitigated somewhat by their obliteration or closure in all alternatives) and the decrease of cover. These changes result in short-term, increased vulnerability for some wildlife species. Elk vulnerability results in displacement as well as an increase in bull harvest during the hunting season. Other hunted and trapped wildlife are impacted by access from the associated disturbance and greater accessibility to being trapped.

Historical and past grazing has resulted in a high percentage of the grasslands in the mid to lower seral stages, most notably in the south end of the Implementation Area. In addition, numerous mesic and wet areas that occur within timbered areas and along meadow edges are in early successional stages. The early seral stages favor generalist wildlife species. Although it is not desirable to have all vegetation in climax stages, it is desirable to have a mosaic of successional stages represented for habitats. Past and present activities have altered the natural mix of seral stage representation. This has resulted in a lower or changed diversity of wildlife throughout the landscape.

Elk and riparian dependant species will be impacted by prescribed burning, timber harvest and cattle grazing on a continuing basis. Cattle grazing during summer months has the ability to displace elk from preferred summer habitat on public lands. The additional roading and unit harvest associated with this proposal will allow cattle to penetrate into areas they currently do not graze. Ungulate grazing, primarily livestock can alter the composition of the vegetation by adding exotics as well as concentrating grazing in riparian areas. This concentration can cause a high intensity of use over the growing season resulting in a decline of vegetation vigor. Eventually, species more tolerant to intense grazing become dominant. The net impact of grazing in riparian areas is changed plant and wildlife communities associated with riparian habitat.

The vegetation treatments being proposed in conjunction with ongoing activities will alter riparian habitat, mature coniferous forest habitat and old growth habitat. Declines in riparian habitat would be due do an increase in use by cattle. Mature coniferous and old growth habitat declines are due to fragmentation from the associated roading and timber harvest being proposed. These activities have been occurring over the last 10 to 20 years resulting in a decline in habitat. This vegetation proposal coupled with road closures has the potential to arrest the fragmentation associated with roads through effective road closures. Fragmentation has always occurred in wildlife habitats, if an alternative is selected that reduces the amount of conifer cover that is fragmented, resulting in historic patch sizes, long term wildlife diversity has the potential to be maintained.

The Atlanta-Wagner AMP revisions are scheduled to be completed in and implemented in the spring and summer of 1995. These AMP revisions are likely to implement controls on riparian grazing. The new riparian grazing guidelines, if implemented, will result in positive changes in riparian habitat. These guidelines coupled with the vegetation proposal have the potential to improve wildlife habitats for all species by reducing fragmentation, reintroduction of fire throughout the landscape, maintaining a variety of successional stages, and maintaining the integrity of unique habitats.

The remaining reasonably foreseeable actions all relate to access and continued increase in human activity. As stated previously, access causes funneling of humans and livestock in greater concentrations. This concentrated use displaces wildlife from various habitats, for part or all of the use period. If this displacement continues over a period of time the displacement becomes permanent and causes displacement of species from that habitat. Within the Implementation Area access of humans by roads and trails has probably been the major cause of long term habitat alteration due to introduction of exotic species and displacement of native species through exploitation and disturbance resulting from human activities. Any activity (current or proposed) that maintains or increases access that results in greater human concentrations in the Implementation Area will likely result in continued habitat degradation. If habitats continue to decrease in quality they in turn will cease to support the necessary components needed for healthy wildlife populations over the long term.

G. Cumulative Effects In Relation to Fragmentation, Corridors, and Linkages

As human expansion continues across valleys surrounding the Big Belts and in some cases encroaching into them, their effectiveness as a biological corridor will cease. The effectiveness of corridors will depend upon the type of wildlife, the type of movement, and the type of corridor (Hunter 1990). With the exception of a few species, or groups of species (notably goshawks, bald eagles, wolves, and migrant songbirds) the Belts have probably ceased to function as biological corridor at a regional level due to the disruption of linkages between the Elkhorn, Yellowstone, and Glacier complexes.

The implementation of the project will expand fragmentation into the Camas and Irish Gulch roadless areas to varying degrees, dependent upon the chosen alternative, which will erode core refugia cover for forest interior species within the Belts (at a level well below what historic processes might have). The effects of entry into these core areas will be some what mitigated by the reclamation of roads following entry, but there will be an effect. Access to these roadless areas for such purposes as hunting, trapping, and recreation will continue to be on foot or horse following entry, therefore effects of predation on Sensitive and Management

Indicator Species by humans should be close to present levels. Vulnerability to predation from other wildlife species may increase, with the additional openings, within roadless areas.

9. SOCIAL/ECONOMICS

A. Introduction

The following discussion of the social and economic effects of the alternatives is based on the analysis of benefits and costs derived from the SNAP II computer model that was used for this analysis. The specific data for the analysis is contained in the project file (printouts from the model) along with a brief description of the model and how it was used for this project.

The analysis done for the FEIS includes updated information based on further refinement and ground truthing of the alternatives and also corrected several minor errors noted after issuance of the DEIS. It has also been updated to provide response to pertinent issues raised by comments to the DEIS.

1. Social

The proposal and the other alternatives considered would have social and economic impacts. The primary social effects would be to the local communities, White Sulphur Springs and Townsend, and to recreationists and others who use this part of the Helena National Forest for outdoor activities.

The No Action Alternative would result in a continuation of existing social conditions and trends. It would provide no timber to the market place.

With all the action alternatives, there would be changes to the landscape which would in turn change wildlife habitat and the general setting of the area. In all action alternatives, these changes would not be expected to significantly change the amount or the ways (mostly recreation activities like hiking, hunting, site seeing, etc.) in which people use the area; therefore, economic spin-offs to local businesses like gas stations, motels, and restaurants would not change appreciably from the current situation. This would not be much different from continuation of the existing situation under the No Action alternative.

See also the discussion on recreation and wildlife, which includes big game Hunting.

2. Economic

The primary economic impacts from this proposal are directly related to timber harvest, related activities, and the manufacture of lumber. There are loggers who live in the local area and there are several mills in the market area for the wood. The two closest manufacturing locations are Townsend, MT and Livingston, MT. People working in the logging and lumber manufacturing industry would derive the greatest direct economic benefit from implementation of any of the action alternatives. Selection of any of the action alternatives would directly provide jobs in this industry. Indirect economic benefits are also occur in basic support businesses such as fuel, food, repairs, etc.

The timber offered for sale on the Helena National Forest is important to the local timber industry. Recent years have seen an increase in demand for lumber and other wood products. This has resulted in an increased demand for the timber that is offered for sale. These conditions have resulted in some of the highest prices ever paid for timber on the Helena N.F. within the last year. The future short term (five years) trend for availability and price of timber in this area are expected to continue, i.e. continued strong demand and high prices.

The alternatives will be compared based on the Benefit/Cost (B/C) ratio, Present Net Worth (PNV), and volume harvested (MMBF = million board feet). This information will be shown for both the total project costs and for just the timber harvest portion.

Calculations for these comparisons were done using the SNAP II model. The costs included are for logging, road building, road closures, regeneration of trees, burning, weed control, and sale planning/ layout. Between draft and final, all costs were reviewed and updated as appropriate to keep them current. The returns are based on an estimated delivered log price of $450/MBF, which approximates the value currently being paid for delivered logs at local area mills.

In all the action alternatives, there are varying amounts of grass and timber burns included. These activities would cost money to implement and would have no direct economic benefits. The costs of implementing these activities are displayed below. These costs are not included in the economic analysis comparison noted above. These activities could occur whether or not timber is harvested. Burning these areas is proposed and designed to maintain/improve ecosystem health. Thus, improved ecosystem health would be the benefit and currently there is no way to measure the dollar value associated with these changes.

The costs of the prescribed burning of grass and timber areas are estimated to be $100/acre for both types of treatment. By action alternative these costs would be Alt. A: $405,400; Alt. C: $345,500; Alt. D: $148,200; Alt. E: $127,200; and Alt. F: $273,000.

Table IV-10 displays economic information when only the costs related to the timber harvest are considered.

TABLE IV-10
PNV, B/C, VOLUME BY ALTERNATIVE

ALTERNATIVE	PNV $	B/C	GROSS RECEIPTS $M *	VOLUME (MMBF)
A	357,325	1.18	2,700	9.0
B	N/A	N/A	0	0
C	-603,524	0.74	1,890	6.3
D	866,169	1.36	3,660	12.2
E	657,361	1.34	3,030	10.1
F	-976,256	0.76	3,360	11.2

*Gross receipts to the government based on an estimated stumpage value of $300/MBF.

The following table displays the same economic indicators when all implementation costs are considered.

TABLE IV-11
PNV, B/C, VOLUME BY ALTERNATIVE

ALTERNATIVE	PNV $	B/C	GROSS RECEIPTS $M *	VOLUME (MMBF)
A	8,550	1.07	2,700	9.0
B	N/A	N/A	0	0
C	-1,067,954	0.66	1,890	6.3

ALTERNATIVE	PNV $	B/C	GROSS RECEIPTS $M *	VOLUME (MMBF)
D	696,878	1.30	3,660	12.2
E	427,653	1.25	3,030	10.1
F	-1,321,496	0.72	3,360	11.2

Approximately 25 percent of the gross receipts would be returned to Meagher County, where the timber harvest would occur. If Alternative A were selected, 25 percent of the projected receipts of $2,700,000, or approximately $675,000 would be returned to the county to be used for roads and schools. Alternative D harvests the most timber which provides the largest revenue; thus, it would provide the greatest amount of money return to the county.

B. Direct and Indirect Effects by Alternative

1. No-Action Alternative

Alternative B, No Action, would not harvest any timber and therefore would not provide wood to the market place. Thus, no new jobs or income would be generated over that already being supported by the area. * While PNV and B/C are shown to be N/A for this alternative, it should be noted that it does have the costs of analysis and the preparation of this document associated with it. The costs of analysis are considered "sunk" costs and as such are not included in the costs for this and any of the other alternatives.

2. Action Alternatives

When estimating the economics of only the timber related costs, Alternative A has a positive PNV and B/C ratio of 1.18 (above 1.0 indicates more money is returned than expended, below 1.0 means more money is expended than returned to the government). Based on these criteria, it is the third most economic alternative.

Alternative C has a negative PNV and B/C ratio well below 1.0. Alternative F is the least economically attractive alternative. Alternative C also provides the least amount of timber volume.

Alternative D has the highest PNV and B/C ratio. It would return $1.36 for every dollar invested. This alternative also harvests the greatest amount of timber, 12.2 MMBF and has the highest PNV, $866,169.

Alternative E has the second highest positive PNV and B/C ratio. It provides about 10 MMBF of sawtimber to the market.

Alternative F produces the second highest level of timber volume, but loses the greatest amount of money of all the alternatives. The B/C ratio is 0.76.

The ranking of the action alternatives (based on PNV and B/C) in order of most to least economically efficient is: 1) Alt. D; 2) Alt. E; 3) Alt. A; 4) Alt. C; and, 5) Alt. F. It is important to note that Alternatives D and E are fairly close in the predicted economic effects. The most costly Alternatives C and F have effects that are quite similar also.

When looking at the PNV and B/C with all costs considered, the relative ranking of the alternatives do not change. With the additional costs for prescribed fire and road closures added, the PNVs all drop in value and the B/C ratios are all slightly lower.

Both Alternatives C and F make use of helicopter logging, which is a costly harvest method. This harvest method is largely responsible for the lower economic ranking of these two alternatives. The economic effects of these alternatives could be "mitigated" by choosing to not treat the more marginal helicopter units, i.e. those that have longer flight distances, lower volumes per acre, and those with low quality timber.

Jobs are another important factor in evaluating economic effects. For comparative purposes, the greater the amount of timber harvested, the greater the number of jobs that would result from implementation. For example, Alternative D which produces 12.2 MMBF would provide about twice as many jobs as Alternative C which would produce 6.3 MMBF. Approximately 0.1 MMBF provides one person year employment, e.g. Alternative C would provide 63 person years of employment. Because Alternative D produces the most volume, it would provide the most jobs.

10. RECREATION AND SCENERY MANAGEMENT

Effects to the recreation resource are discussed in relation to scenery (visual resource) recreation opportunities (hunting) and trail uses and conditions.

A. Introduction

The effects to the scenery resource were evaluated from the sensitive viewing areas listed in the Forest Plan, from other travel routes used by recreationists, and from seldom seen areas. The effects to scenery resources were analyzed in terms of changes to form, line, color and texture, and the ability to meet visual quality objectives. Cumulative effects as well as effects of individual proposed vegetation treatment units will be addressed. Issue 4: *The Effects of Building New Roads Within the Implementation Area,* specifically included concerns about the visual scars created by new roads.

Vegetation treatment and road construction can affect the visual resource. The actual effects depend on:

- ●) design, shape, and grouping of treatment units;
- ●) vegetation treatment method and silvicultural system used;
- ●) slash treatment methods;
- ●) access roads and skid trails, and;
- ●) topography relative to the viewer's position.

B. Effects Common to All Action Alternatives

1. Visual Resource

Under the action alternatives, the Implementation Area would be visually altered by both ecological changes and human activities. Treatment units are potentially visible from sensitive viewing areas listed in the Forest Plan only from background viewing distances. None of the alternatives propose vegetation treatments which would cause irreversible or irretrievable commitments of scenic resources.

a. Prescribed Burning

All action alternatives involve prescribed burning of timber and grass. The timber burning consists of burning understory vegetation (six feet or less) and some small islands of conifers. Some blackened boles and scorched trees would be visible at foreground and near mid-ground viewing distances. Old growth Douglas-fir trees and other overstory trees would be retained. A fireline may be constructed around the timber burn units, consisting of approximately 18 inches of clearing to mineral soil, limbing of trees, and cutting of some trees to create an "air space" between the unit and adjacent vegetation. The disturbed soil typically reseeds itself and revegetates within the first growing season.

b. Timber Harvesting

All alternatives provide for leaving 25 percent of each treatment unit in untreated islands,with untreated islands being a minimum of 30 feet across. Ridges, midslopes, draws and drainages are favored areas where vegetation would be reserved.

All action alternatives include using the cable logging system on some units with steep slopes (usually over 35%). Limitations of cable logging often result in units with hard, straight edges and geometric shapes. Mitigation measures include designing units to optimize the 100 - 120 foot lateral yarding capabilities on sides. The depth of the units should vary. Where adjacent terrain allows tractor logging (on slopes less than 35%), edges can be modified to a more irregular line, thus more closely resembling natural clearings. Those cable units with individual tree selection prescriptions would be harvested when soils are frozen or snow-covered. This technique would minimize ground disturbance and reduce the visual effect of yarding corridors on these openly forested and sparsely vegetated sites.

To meet the VQO assigned in the Forest Plan (Partial Retention for areas seen from sensitive viewing areas; Modification for other areas), the proposed treatment units must borrow from naturally established form, line, color, or texture so completely and at such a scale that its visual characteristics are those of existing natural occurrences within the surrounding area. The word "natural" as currently used in the Visual Management System describes existing clearings which were not manmade. Such natural clearings now occurring in the Implementation Area are numerous, often exceeding a hundred acres in size, and characterized by irregular shapes/edges. Before the days of fire suppression, wildfires created a wide spectrum of opening sizes, resulting in an enormous range of natural variations.

c. Roads

All alternatives except for Alternative F, construct new roads, all of which would be recontoured and revegetated or physically closed to motorized vehicles after vegetation treatment activities are completed. A mitigation measure to reduce the potential for line contrast between the revegetated roadbed and the surrounding vegetation, especially across natural clearings, is to use a seed mix specific to the immediate area. This mix will be different in timbered areas than in natural clearings. Some temporary roads will be ripped and seeded, followed by placement of slash, debris and large rocks. The placement of slash and debris will only be done on road segments that pass through timber, and not in natural clearings. This reduces the visibility of the treatment, and provides nutrient return to the soil as the woody material decomposes.

There is always the potential for an increase in noxious weed infestation following ground disturbing activities such as road building or obliteration. Monitoring and timely treatment of these areas would reduce the risk of increasing existing infestations. Followup treatment with biological control agents for specific weed species would control weed populations to a more tolerable level.

2. Trails

The Camas Creek Trail #141 is not affected by any of the action alternatives.

a. Prescribed Burning

Prescribed burning is not expected to have any appreciable affects on the trails systems within the Implementation Area. This is because large stands of tall timber are not expected to be burned, thus not creating a long term maintenance problem.

3. Hunting Opportunities

Prescribed grassland burning would result in a short term (2-3 years) effect on hunting opportunities. This would occur from the time the vegetation is burned until suitable regrowth comes back. Hunters would not want to locate camp sites in recently treated areas until the following growing season, but there would be adequate locations to camp outside treatment areas.

All action alternatives would have varying effects on hunting use within the Implementation Area relative to timber burning and harvesting.

4. Recreation Opportunity Spectrum

All action alternatives propose vegetative treatments which may alter the existing visual condition. Naturalness of setting is one criteria for determining recreation opportunity spectrum (ROS) classes.

All proposed vegetative treatments are located in the Roaded Natural ROS class.

All action alternatives except for Alternative E, construct temporary roads to access treatment areas. Presence of roads is a physical criteria for determining ROS classes. Adding roads to an area could result in a change from Roaded Natural to Roaded Modified, except that in this analysis area all roads constructed will be either recontoured and revegetated or physically closed. In addition, some existing roads will also be closed by naturalizing the roadbed.

The visual effects of a temporary road will depend upon the type of vegetation through which it is constructed. Where a temporary road is constructed through natural clearings to access timber stands, the duration of visual impacts will be short term (1-5 years). Where a temporary road passes through timber, a treeless corridor may be visible until trees regenerate on the roadbed and reach a sufficient height to blend with adjacent timber (20-25 years). Alternative D, with 27.8 miles of temporary road construction, and Alternative A, with 15.7 miles of temporary road construction, would have the most potential to introduce line contrast due to temporary road construction in timbered areas.

Since temporary road construction is scattered throughout a large area, no changes in ROS classes are expected to result from vegetative treatments with Alternatives A, C, E, and F in the Wagner-Atlanta analysis area. However, Alternative D has several seedtree cutting units to be harvested with cable logging method, which could substantially alter the visual condition at near distance from roads and trails in the area. This could result in changes within the Roaded Natural ROS class to Roaded Modified.

C. Direct and Indirect Effects by Alternative

1. Visual Resource and Trails

Due to the similarity of effects for these resources, they are discussed together.

Alternative A

Most proposed units would meet the VQOs from sensitive viewing areas listed in Appendix B of the Forest Plan, due to the background viewing distances (beyond 4 miles). Unit A51 is a 204 acre seedtree unit to be harvested by cable method. If mitigation measures are followed, this unit could also appear as a natural occurrence when viewed from background viewing distances.

Views of units from other routes used by recreationists include:

Unit A51 is adjacent to Trail 118 (a 4 wheel drive road at this location). The unit would be visible, but slopes steeply away from the road. Trail 118 would become a reconstructed road in this area so that logs could be yarded up to the road.

Unit A9, a 97 acre clearcut near Mule Creek, would be harvested with cable logging methods. This unit would be visible at a mid-ground viewing distance of two to three miles from Trail 118 and Boulder Baldy (a hiking trail at these locations).

Unit A1, a 303 acre clearcut on Camas Ridge to be harvested with cable logging methods, would also be visible from hiking Trail 118 as well as County Road 360 (Smith River access). The unit is adjacent to Camas Trail No. 141, a jeep trail. Scenic quality of this trail could be maintained if the unit boundary is pulled away from the trail. Both units A1 and A9 are in an area of continuous canopy, and would be in contrast to the surrounding landscape. Visual impacts of these cable units would be softened if the unit edges are "feathered" into the surrounding timber, and if the edges have a somewhat irregular shape to mimic natural clearings.

Unit A11, a shelterwood cable unit, dissects Kentucky Gulch Trail 154, mainly used by hunters. Scenic values along this trail would be maintained if the unit is redesigned to avoid the trail, and if no skidding of logs occurs across the trail.

Alternative A has moderate visual impacts due to vegetation treatments, road construction and reconstruction.

Alternative B

A No Action Alternative would result in no additional man caused visual impacts from management activities at this time. Natural evolution of the vegetative component would continue. Regeneration in existing harvest units would also continue to grow and achieve visual recovery. Except for existing roads, the area would eventually attain a "natural" appearance with only ecological changes occurring. Natural events, such as mortality from insect and disease infestations, wind storms, and fire will continue and cause additional changes to the visual resource. A continued buildup of fuels in the area will occur if no vegetation treatment occurs. A catastrophic fire could result, affecting scenic values across the entire Big Belt Mountains and creating trail maintenance problems due to associated downfall across trails.

Alternative C

All proposed treatment units would meet VQO's from sensitive viewing areas. Recreationists hiking on Trail 118, the Belt Crest Trail, would be able to see several treatment units. However, all harvest units except C3 are partial cut units (selection, shelterwood or thinning), which serve to introduce texture and variety without strong contrast to the surrounding landscape. C3 is a 104 acre clearcut to be harvested by cable logging methods. See above for mitigation measures to reduce the visual impacts of cable logging.

Harvest unit C20 is adjacent to Trail 4161 for about .2 miles. To ensure the scenic quality of this trail is maintained, a buffer zone should be left between the trail and treatment areas.

Alternative C would have low visual impact from all viewing areas.

Alternative D

This alternative has numerous seedtree units proposed for cable logging. Seedtree units have 10-12 trees per acre remaining, in addition to the reserve islands of untreated timber. Some of these units would be visible

from the sensitive viewing areas. Many of these seedtree cable units are also visible from Trail 118 and County Road 360.

Unit D6, a 154 acre clearcut in the Mule Creek drainage, is visible from Trail 118 and Boulder Baldy (a hiking trail in these locations). The vegetation in the area of unit D6 is a continuous canopy so that the unit would be in contrast to the surrounding landscape. Careful design and feathering edge techniques would help to reduce visual impacts.

Unit D11, a clearcut cable unit, is yarded from Belt Crest Jeep Trail 118 (Road 287-F1). The trail would be reconstructed in this area, and logs pulled up to the trail. No visual screen can be left with this logging method. The boundaries of this unit should be altered to avoid this trail and to provide an untreated buffer zone to maintain the scenic viewing along this trail.

Unit D3 is a clearcut unit which is also adjacent to Trail 118, as well as D15 and D21. In addition, these units would physically disturb the trailhead.

Unit D44 dissects the Needham Trail 236/Road 259 A-1. This trail is an extension of the Belt Crest Trail system, and is used for scenic viewing and hunting. To reduce trail damage and maintain scenic values, trees could be retained along the trail corridor and logs should not be skidded across the trail. The lower portion of this trail could also be rerouted to avoid private land in this area, thus avoiding the treatment unit.

Alternative D would result in the most visual impacts of vegetation treatments and roading from all viewing areas.

Alternative E

This alternatives stays out of all areas currently designated as roadless. Vegetation treatments are concentrated in the roaded portion of the analysis area. Visual impacts in these areas would be heavy as viewed from Trail 118, especially in the Lambing/Priest area. Much of this area is also visible at background viewing distances from sensitive viewing areas listed in the Forest Plan. See above for mitigation measures to reduce visual impacts of cable units.

Units E4, E5 and E6 are adjacent to the Belt Crest Trail 118. Though portions of this area have been logged in the past, this trail/road is managed for scenic viewing at a sensitivity level 2 emphasis. Some screening should be provided.

Unit E34 dissects the Needham Trail 236/Road 259 A-1. This trail is an extension of the Belt Crest Trail system, and is used for scenic viewing and hunting. To reduce trail damage and maintain scenic values, trees could be retained along the trail corridor and logs should not be skidded across the trail.

While Alternative E has no vegetation treatments in roadless areas, the roaded areas of the analysis area would have a high concentration of treatment units.

Alternative F

The units prescribed for cable yarding are all selection cuts, which would be harvested when soils are frozen or snow-covered. Visual impacts of yarding corridors would be minimized.

Units F9, F10, F11, F12 and F13 are located adjacent to the Belt Crest Jeep Trail. Except for F11 (cable selection cut) the units are partial cuts which would be tractor logged, allowing more complex edge design of the units and greater versatility in yarding the trees. Views of treatment units could be minimized by retaining trees next to the jeep trail.

Unit F38 dissects the Needham Trail 236/Road 259 A-1. This trail is an extension of the Belt Crest Trail system, and is used for scenic viewing and hunting. To reduce trail damage and maintain scenic values, trees could be retained along the trail corridor and logs should not be skidded across the trail.

Alternative F has low visual impacts. No new roads would be constructed, no existing roads would be reconstructed, 21.0 miles of existing roads would be administratively closed, and all cable units are selection cuts.

2. Hunting Opportunities

Alternative F

Alternative F has the greatest total acres of timber burning and harvesting proposed. This alternative would remove the greatest amount of forested vegetation. The noise associated with this activity would likely displace elk and deer, and, to some extent, upland game birds until harvesting is completed. Hunters who historically hunt in this area would probably hunt in other areas. Discontinuing harvest activities during the hunting season would minimize this displacement.

Alternatives A, C, D, and E

Alternatives A, C, D and E all have similar proposed acreages of timber burning and harvest. The effects to hunting use within the Implementation Area would be similar to those identified for Alternative F, but to a lesser extent.

Alternative B (No-Action)

Hunters should not be affected if this alternative is implemented. However, should a large wildfire occur, then hunters would be displaced from this burned area until it begins to revegetate.

D. Cumulative Effects

Visual impacts on the landscape from the results of this action must be considered when added to other past, present, and reasonably foreseeable future actions.

None of the proposed actions involve irreversible or irretrievable commitments of the visual resource or visual values. Additional roads would have the potential for long term resource commitment but no permanent roads are proposed.

Alternative D proposes to harvest several seedtree units by cable logging methods. The setting may be changed from "slightly altered" to "moderately to heavily altered".

The No Action alternative may result in the greatest cumulative effect over time. Before fires were aggressively suppressed, fires burned periodically which served to reduce a buildup of fuels. Such fires left a mosaic pattern of stands in different age classes. During the past 50 or so years of fire suppression, fuels have built up to dangerously high levels, setting the stage for large, stand-destroying catastrophic fires. Such fires could result in negative visual impacts across the entire mountain range.

11. ROADLESS AREAS

A. Introduction

The effects to the Inventoried Roadless Areas associated with implementing each alternative are discussed in relation to their natural integrity/apparent naturalness, remoteness/solitude/primitive recreation opportuni-

ty, unique features and management boundaries. The direct, indirect and cumulative effects of the alternatives on the Roadless Areas are presented in the same order they appear in Chapter III.

B. Effects Common to All Action Alternatives

1. Grassland Burning

Because the prescribed fire treatments are a natural process that are being proposed within the frequency and patch size they would occur under natural conditions, there will only be a one to two year short term impact to the resource. There will be no effect on the wilderness attributes of the Roadless Areas.

2. Timber burning

Proposed treatment units sizes are well within the average natural burn frequency and patch size identified in the Big Belt Landscape Analysis. Though the visual impact would last longer on the landscape, this is part of a natural process that is within the natural range, thus not impacting the overall wilderness character of the Roadless Areas.

A potential man-made impact could be with how the prescribed burns are controlled regarding the use of chainsaws. The sawed stumps left behind along control lines would lessen the apparent naturalness of the treated areas. Also, primitive recreation opportunities would be temporarily reduced for the treated areas during the first few years following the burning as recreationists would generally not be attracted to them. Once the blackened areas green up, primitive recreation use would resume again. As a mitigation to these impact, treatments would be kept away from trail corridors so that there is adequate screening from treatment units.

C. Direct and Indirect Effects by Alternative

1. Alternative A

Cayuse Mountain Roadless Area

The majority of the proposed timber harvesting (191 acres) is located in Section 26 within the northeast corner of the Roadless Area. In addition, 31 acres of timber harvest is proposed in Rocker Creek on the eastern boundary of the Roadless Area.

Natural Integrity/Apparent Naturalness: Section 26 is bounded by private land on all four sides with timber harvesting having occurred on the west and south sides. The proposed timber harvesting would further contribute to weakening the natural integrity and apparent naturalness, affecting the entire Section with evidence of human presence. Approximately 671 acres of the Cayuse Mountain Roadless Area would be affected by the proposed timber harvest and reclamation of 3.4 miles of temporary roads.

Remoteness/Solitude/Primitive Recreation Opportunity: These wilderness attributes would be directly affected during the time the timber harvesting and road reclamation is conducted by the noise from machinery associated with this activity in the areas described above. Recreationists would avoid the treatment areas until they begin to revegetate.

Since this area does not offer a high degree of solitude and remoteness because of its narrow shape, proximity to roads and previous activities, the proposed timber treatment would add to this degraded situation.

Unique Features: There are no unique features to be affected by the proposed treatments.

Manageability/Boundaries: There would be a total of 18,682 acres unaffected by this alternative.

Acres Affected: With implementation of Alternative A and the presence of previous roading and timber harvest on private land affecting 1,191 acres, unaffected acres would be reduced to 18,162.

In summary, the wilderness eligibility of this roadless area *would be* retained.

Irish Gulch Roadless Area

Natural Integrity/ Apparent Naturalness: The proposed timber harvest would affect approximately 2,448 acres. This is primarily caused by the proposed shelterwood harvest that extends across the narrow (1 mile wide), middle portion of this relatively small roadless area, cutting off the southern part from the rest of the roadless area. Evidence of human activity, such as tree stumps and linear corridors where temporary roads were reclaimed would break up the limited natural integrity of this area.

Remoteness/Solitude/Primitive Recreation Opportunities: These wilderness attributes are not strongly represented in this roadless area because of its narrow shape and extensive roading and timber harvesting that form the north, west and south boundaries. Also, there are several motorized access roads into this area, though the closing of about 1.2 miles of the Thomas Gulch road would improve this situation. The proposed timber harvest treatments would further contribute to the weakening of this already limited type of experience during the short term while harvesting and road reclamation activities are carried out. Area recreationists would be displaced to other areas until activity ceases . Log hauling on the Benton Gulch Road #287 would increase noise penetration into the roadless area during operations.

Unique Features: There are no unique features to be affected.

Manageability/Boundaries: Implementation of the the proposed timber harvest treatment in Section 10 that extends across the middle of this roadless area at its narrowest point would break this area into two pieces. There would be about 5,339 acres located in the northern portion of the roadless area that would be unaffected by this alternative, barely meeting the size requirement for wilderness consideration. As a result of the proposed treatment, the southern boundary would not be in a manageable location unless it were moved to the north.

Acres Affected: Existing timber harvest and related disturbances in addition to the proposed activity in Alternative A would lead to 2,768 affected acres resulting in 5,019 unaffected acres. If the resulting southern boundary were moved to a manageable location, then the Roadless Area would not meet the minimum size requirement of 5,000 acres.

In summary, the Irish Gulch Roadless Area *would not* retain its wilderness eligibility as a result of implementing this alternative.

Camas Creek Roadless Area

Natural Integrity/Apparent Naturalness: The proposed harvest treatments in Alternative A would affect 304 acres by leaving tree stumps and skid trails as evidence of man's activity adjacent to the Atlanta/Mule Road.

Remoteness/Solitude/Primitive Recreation Opportunities: Conducting the proposed timber harvest treatments and log hauling would reduce the remoteness, solitude and primitive recreation value that this roadless area has to offer until activities are completed. Activity would temporarily displace recreationists away from the eastern portion of the roadless area that is within the Implementation Area. Closing .64 miles of road in

the Mule Creek area as proposed with this alternative would help to improve this wilderness value. Recreationists would return to this area once activities cease and would begin to use the treated areas after they start to revegetate.

Unique Features: The proposed activity would not directly affect the special features of this roadless area except for its high scenic quality when viewed mainly from the east, outside its boundary. The 227 acre clearcut proposed along the top of Camas Ridge would be easily seen from highway 360 as background scenery. As a mitigation to this impact, the edges of the timber harvest treatment units would need to be irregular and feathered to simulate a natural opening.

Manageability/Boundaries: The incursions associated with the proposed timber treatments would still leave 28,528 unaffected acres. The eastern boundary of this roadless area would need to be moved to exclude the proposed treatment areas. Because of the topography of the area, the new boundary could be placed on side ridges or in drainage bottoms for better manageability, but not to a great extent.

Acres Affected: Existing incursions (in addition to those associated with this alternative) would presently affect a total of 2,639 acres resulting in 26,193 unaffected acres.

In considering the effects to the previously described wilderness attributes, the wilderness eligibility for the Camas Creek Roadless Area *would be* retained.

2. Alternative B

This alternative would have no direct effect to the Roadless Areas because no treatments are proposed. The amount of unaffected acres would not change from the figures shown in Chapter III.

3. Alternative C

Cayuse Mountain Roadless Area

All harvest treatment units are located in the Rocker Creek area.

Natural Integrity/Apparent Naturalness: The proposed treatments would affect 1,753 acres with the presence of sawed tree stumps and skid trails detracting from the natural integrity and apparent naturalness of the area.

Remoteness/Solitude/Primitive Recreation Opportunities: The proposed timber harvest would greatly impact the Rocker Creek area, north of Cayuse Mountain and east of Needham Mountain during logging and road reclamation phases. Recreations would avoid this area until operations cease and begin to use the harvested areas once they start to revegetate. Solitude and remoteness is not well represented in this area because of its narrow shape and current roading.

Unique Features: Scenic viewing of Needham and Cayuse Mountains would noticeably be impacted by the 473 acres of treatment openings and temporary roads for the first few years, until trees and other vegetation becomes well established. The proposed treatment is acceptable for the area's modification visual quality management parameters.

Manageability/Boundaries: Implementation of this alternative would result in 17,600 unaffected acres. The eastern boundary would need to be moved to the ridge top from Cayuse Mountain, following the ridge road, north to the head of Campbell Creek for manageability purposes and to avoid evidence of human influences.

Acres Affected: The existing incursions that are identified in Chapter III in addition to those caused by Alternative C would lead to a total of 2,273 affected acres. This would result in 17,080 unaffected acres, thus reducing the size of the Cayuse Mountain Roadless Area.

Overall, wilderness eligibility of the Cayuse Mountain Roadless Area *would be* retained.

Irish Gulch Roadless Area

Natural Integrity/Apparent Naturalness: The proposed timber harvest would affect about 74 acres along the western boundary just north of the Ohio/Benton Gulch junction with evidence of tree stumps and reclaimed road corridors.

Remoteness/Solitude/Primitive Recreation Opportunities: Conducting timber harvest and log hauling would effect this limiting wilderness attribute, but to a lesser extent as compared with Alternative A. Machinery noise would temporarily displace area recreationists, mainly hunters, from this portion of the roadless area until activity is completed. This roadless area would provide a greater degree of remoteness and solitude over the long term with the closure of 4.3 miles of existing roads but this would have a limited benefit because of the area's small, narrow shape.

Unique Features: There are no unique features to be affected.

Manageability/Boundaries: Alternative C would not greatly affect the manageability and boundaries of this roadless area. Approximately 7,713 acres would be unaffected. The western boundary located at the junction of Ohio Gulch and Benton Gulch would need to be moved to the east, excluding the treatment unit.

Acres Affected: Existing incursions as discussed in Chapter III along with those associated with this alternative would affect a total of 394 acres leading to 7,393 unaffected acres.

Wilderness eligibility of the roadless area *would be* retained.

Camas Creek Roadless Area

Natural Integrity/Apparent Naturalness: The net result of the proposed timber harvest (194 acres) and closure of existing roads would affect a total of approximately 694 acres.

Remoteness/Solitude/Primitive Recreation Opportunities: The 194 acres of timber harvest would reduce these wilderness characteristics along the Atlanta/Mule road during harvesting, log hauling and road reclamation activities. Once the treatment units begin to revegetate, recreations - mainly hunters, would start to use these areas again. Closing 5.9 miles of existing roads would help to improve this roadless area's remoteness and provide a higher degree of solitude.

Unique Features: Same as alternative A.

Manageability/Boundaries: In considering the proposed timber harvest and proposed existing road closures, there would be approximately 28,136 acres of this roadless area unaffected. After the proposed road closures are implemented, the incursion created by the Atlanta/Mule Creek road would be reduced to where much of the original roadless area boundary would be effective in this area. However, the boundary does not follow well defined topographic features.

Acres Affected: A total of 1,609 acres would be affected by existing incursions identified in Chapter III and those associated with Alternative C. This would lead to 27,223 unaffected acres.

The overall effect of Alternative C when cumulative effects are considered is that the wilderness eligibility of the Camas Creek Roadless Area *would be* retained.

4. Alternative D

Cayuse Mountain Roadless Area

Natural Integrity/Apparent Naturalness: This alternative would affect about 397 acres with sawed stumps as evidence of man's presences.

Remoteness/Solitude/Primitive Recreation Opportunities: The effect on these wilderness attributes would be similar to Alternative C, except to a lesser extent as much fewer acres would be treated and affected. The treatment units are in the same general location as in Alternative C.

Unique Features: Scenic viewing of the Needham and Cayuse Mountains would be affected by the 147 acres of timber harvest. The openings created would be smaller than those in Alternative C, but they would still be visible as foreground and midground from the Ridge Road No. 4161 and as background from Highway 360. Shaping the units to resemble natural opening and feathering their edges would help to lessen their visual impact. The effect is acceptable within the area's modification visual quality management parameter.

Management/Boundaries: This alternative would lead to 18,956 unaffected acres. The eastern boundary would need to be moved to the west, probably to the Big Belt Mountain divide in the Rocker Creek area, to exclude the treatment areas to avoid evidence of human activity.

Acres Affected: Existing incursions on private land in addition to those from this alternative would result in a total of 917 acres affected. This would decrease the amount of unaffected acres to 18,436 acres.

The wilderness eligibility of the Cayuse Mountain Roadless Area *would be* retained.

Irish Gulch Roadless Area

Natural Integrity/Apparent Naturalness: With this alternative, approximately 938 acres would be affected by the presence of cut tree stumps. The total acres that could be considered for wilderness within this roadless area would be reduced by the amount of affected acres.

Remoteness/Solitude/Primitive Recreation Opportunities: The proposed timber harvest would reduce these wilderness attributes throughout the central portion of this roadless area. The core area would be removed, thus creating a very narrow, less then 1/2 mile wide, roadless area. This would reduce recreationists ability to get away from the noise and sight of human influence during treatment activities and temporary road reclamation. Recreationists would begin to utilize the treated areas once they start to revegetate.

Unique Features: There are no unique features to be affected.

Manageability/Boundaries: This alternative would result in 6,849 acres being unaffected by the proposed activities. The resulting roadless area would be narrow, curving and relatively small. There would be many miles of boundary to administer for such a small roadless area.

Acres Affected: Incursions caused by existing timber harvesting on private land as well as those from this alternative would lead to 1,258 affected acres. This would result in 6,529 unaffected acres.

Though this area has vary little wilderness character, its wilderness eligibility *would be* retained, by not dropping in size below the 5,000 acre limit.

Camas Creek Roadless Area

Natural Integrity/Apparent Naturalness: This alternative would affect 1,424 acres beyond what currently exists, thus reducing the size of the area that could be considered for wilderness.

Remoteness/Solitude/Primitive Recreation Opportunities: The proposed timber harvest treatments would diminish the area's remoteness, solitude and primitive recreation opportunities during implementation and reclamation of the temporary roads. Most of the proposed treatments are clearcuts and they would take longer to revegetate, thus taking longer before recreationists begin to use the treated areas.

Unique Features: The scenic quality of the area would be impacted and readily visible from the Altanta/Mule Road in the foreground and middle ground and Highway 360 in the background. Feathering the unit's edges and shaping them like natural openings would help to minimized this effect.

Manageability/Boundaries: Approximately 27,408 acres would be unaffected through implementation of this alternative. The boundary in the Mule and Atlanta Creek areas would be moved to the west to exclude the proposed treated areas. The resulting boundary would not be in an easily definable location.

Acres Affected: The cumulative effects of existing and proposed incursions related to Alternative D would affect 3,759 acres. This would lead to 25,073 unaffected acres.

In considering the impacts of this alternative, the Camas Creek Roadless Area's wilderness eligibility *would be* retained, but for a smaller area then presently exists.

5. Alternative E

There are no treatments proposed within the Roadless Areas with this alternative and thus no effects are associated with the Roadless Areas. However, there would be about 3.57 miles of existing roads closed between Mule Creek and Camas Ridge in the Camas Creek Roadless Area. With these road closures, the amount of unaffected acres would increase to 27,917 acres with the elimination of this incursion.

6. Alternative F

Cayuse Mountain Roadless Area

Natural Integrity/Apparent Naturalness: The proposed timber harvest would affect 126 acres. The natural integrity would be reduced by the amount of the affected acres with the presence of sawed tree stumps and skid trails.

Remoteness/Solitude/Primitive Recreation Opportunity: These wilderness characteristics would be diminished in the Rocker Creek area during operations from machinery noise penetrating the eastern portion of the roadless area. Recreationists would be displaced to other areas while operations are ongoing. Recreations, generally big game hunters, would begin to use the treatment areas once they start to revegetate.

Unique Features: Impacts to scenic viewing would be similar to Alternative D. Though fewer acres are treated, no temporary roads are needed.

Manageability/Boundaries: There would be 19,227 unaffected acres associated with this alternative. The eastern boundary would need to be moved slightly westward from Campbell Creek south to the Rocker Creek area to exclude the treatment areas. Also, the boundary in Wagner Creek would need to be moved a little to the west to exclude the seedtree timber harvest treatment.

Acres Affected: Existing timber harvest activities on private and federal land within this Roadless Area in addition to those identified in this alternative would affect 646 acres. This would result in 18,707 unaffected acres.

The wilderness eligibility of the Cayuse Roadless Area *would be* retained.

Irish Gulch Roadless Area

Natural Integrity/Apparent Naturalness: Because of the size and location of the proposed timber harvest treatments, the whole roadless area (7,787 acres) would be affected. The treatments would essentially break the roadless area into three pieces. Each piece would not meet the minimum size of 5,000 acres for roadless consideration.

Remoteness/Solitude/Primitive Recreation Opportunity: These wilderness attributes would be greatly affected as the proposed treatments cover relatively large areas within the central portion of the roadless area, even though these attributes are not well represented. It would be very difficult for recreationists to avoid the noise of the timber harvesting and log hauling activities because this is a fairly small roadless area. Users would be displaced to other areas until activity ceases and vegetation begins to grow back.

Unique Features: There are no unique features to affect.

Manageability/Boundaries: There would be no unaffected acres with implementation of this alternative, thus this roadless area would no longer fit the requirements of a roadless area.

Acres Affected: Existing activities on private land identified in Chapter III affect 320 acres in Sections 26 and 27, T11N, R3E. The combined effects of the existing activities and those from Alternative F would further break up this area. Again, the entire Roadless Area (7,787 acres) would be affected.

The Irish Gulch Roadless area *would not* retain its wilderness eligibility under this alternative.

Camas Creek Roadless Area

Natural Integrity/Apparent Naturalness: Implementation of this alternative would affect about 334 acres between the Mule and Atlanta Creek drainages and along the east fork of Slough Creek. There would be a minimal effect as these areas are adjacent to the roadless area boundary or along previous incursions.

Remoteness/Solitude/Primitive Recreation Opportunity: The effect to these wilderness characteristics would be noticeable along the eastern portion of the roadless area during the time activities are conducted due to noise and the presence of humans. Recreationists would begin to use the area as disturbed areas begins to revegetate. Closing 4.5 miles of existing roads would help to improve this roadless area's remoteness, providing a better opportunity for solitude and primitive recreation experience than currently exists.

Unique Features: Scenic viewing of this area would be affected for the foreground and middle ground from the Atlanta/Mule road and for background from highway 360. Many of the proposed treatments are adjacent to or near existing timber harvest units on private ground. Irregular edged units and feathered edged would help to mitigate this effect.

Manageability/Boundaries: Alternative F would result in 28,498 unaffected acres. The eastern boundary would need to be altered to exclude these treatment areas as well as previous incursions to reflect a roadless area commensurate with the unaffected acres. Manageability would be improved if the boundary lines are moved along topographic features adjacent to the treatment areas, but it would be difficult because of the topography of the area.

Acres Affected: Existing incursions on private and federal land identified in Chapter III in addition to those from Alternative F would affect 2,399 acres. This would result in 26,433 unaffected acres, decreasing the overall size of the Camas Creel Roadless Area. The core area of the roadless area is unaffected.

In considering the above described effects for Alternative F, the wilderness eligibility *would be* retained.

D. Cumulative Effects

1. Cayuse Mountain Roadless Area

The selected vegetation treatment activity for the Wagner Vegetation Manipulation project area and the eastern boundary in the Spring Creek area is located adjacent to this Roadless Area. In addition existing timber harvest activities are occurring in the area. No known future activities are proposed within the Roadless Area.

2. Irish Gulch Roadless Area

No other activities are planned for this area that may affect its roadless character.

3. Camas Creek Roadless Area

The existing Atlanta/Mule road constructed in the mid 1980's from Mule Creek to Camas Ridge currently affects 1,420 acres along the eastern portion of the Camas Creek Roadless Area. Also, the existing Diamond Timber Sale Road, the Stovecamp Trailhead access road and harvesting on private land affect 915 acres. In addition a non-motorized trail is being constructed in the Spruce Creek area, but it will not affect the wilderness character of the Roadless Area.

12. HERITAGE RESOURCES

A. Introduction

Various laws and policies have been designed to insure the protection of important heritage resource properties. The purpose of the effects analysis is to disclose possible effects of proposed treatment activities on these resources. Ground-disturbing activities could be viewed as having the potential to directly effect significant heritage sites. Adverse impacts to heritage resources can result in either partial damage or total destruction of the sites. In truth, heritage resources can be diminished in value by a change in the quality of their historical, architectural, archaeological, or cultural character. When project activities directly and adversely effect heritage resources the effects can be irreversible. Hence, heritage resources are considered "non-renewable" resources.

Since the inception of the Heritage Resource Management Program on the Helena National Forest, various National Heritage Preservation Act (NHPA) inventories to identify cultural properties have resulted. To date, approximately seven percent of the Implementation Area has been inventoried for heritage resources, with the discovery of six heritage resource sites. Site locations for these properties are definite, site-specific, and common to all alternatives. Prior to implementation of an alternative, site specific inventory and evaluation will be done to identify and assess the historical significance of any identified heritage resource site. Subsequently, a decision will be made to either avoid, protect or mitigate affects in accordance with the National Historic Preservation Act.

B. Effects Common To All Action Alternatives

The effects from proposed treatment activities will be similar by alternative, varying in magnitude only by the degree to which prescribed fire and/or timber harvest activities cause ground-disturbing effects. Increased access to remote areas has the potential to have an indirect adverse impact through vandalism and theft.

Even though the management intent is to identify all heritage resource sites and avoid, protect, or mitigate effects to them from proposed activities, the potential exists for unidentified sites to be encountered and disturbed during project activity. If heritage resources are located within contractual timber sale area boundaries they can be eligible for improvement funds for site protection and for developing interpretive opportunities, where appropriate.

There will be "no-effect" to the two identified historic mining districts in the Big Belt Mountains.

C. Direct and Indirect Effects by Alternative

1. Alternative A

Further field examination is needed to verify potential effects to sites 24 ME 73, 24 ME 70 and 24 ME 168, to determine site boundaries in relation to grass and timber burns. If Alternative A is implemented, the prescribed fire ignition in burn unit (NE 1/4 of Sec. 26) would cause an effect to site 24 ME 168, and depending upon site boundaries, potential sites include 24ME, 70 and 73.

If the results of the follow-up Sec. 106 survey show that heritage resources do indeed lie within proposed fire treatment unit boundaries, the District has the option of restoring the unit so that the heritage site lies outside proposed areas of effect or; follow 36 CFR 800 regulations (including consulting with Montana State Historic Preservation Office [SHPO]) to insure ways to mitigate potentially adverse effects to these sites.

2. Alternative C

Further field examination is needed to verify if sites 24 M 70 and 24 ME 168 are within boundaries of the proposed grass burn unit (NE 1/4 Sec. 36 T 12 N, R E2). As proposed, prehistoric site 24 ME 73 may be within boundaries of a proposed timber burn unit (NE 1/4 Sec. 26 T 12N, R 2E).

As currently designed, historic site 24 ME 277 is within boundaries of a proposed harvest unit. This historic mine, with a cabin, adits and a wooded ore cart track lies along the southern stream terrace of Beaver Creek. Harvesting and skidding could adversely effect this site.

Finally, construction of a new road may have an effect on prehistoric site 24 BW 151. A follow-up Sec. 106 inventory is recommended to assess the location of the site in relation to proposed road construction activities.

3. Alternative D

Follow-up Sec. 106 inventories are recommended to determine if prehistoric sites 24 ME 73, 24 ME 168 and 24 ME 70 are within proposed timber and grass burn units. These inventories are necessary before accurate assessment of project effects can be made. If implemented as proposed, the grass burn unit located in E 1/2 Sec. 36, T12N, R2E, would cause an effect to site 24 ME 168. In addition, site 24 ME 73 (NE 1/4 Sec. 26) would be affected by the fire ignition.

If the follow-up Sec. 106 inventory substantiates the conclusion reached during the initial files search review and heritage resources do indeed lie within proposed prescribed fire treatment areas, the District has the options of redesigning the burn unit so that heritage resources lie outside areas of effect from the ignition

or; complete the 36 CFR 800 process, including consultation with Montana SHPO and draft and implement various mitigation measures.

4. Alternative E

As proposed, timber harvesting and skidding prescriptions for proposed cutting unit E-36 will have an adverse effect on the identified sites. Prescribed fire treatments in the grass burn unit located in the E 1/2 of Sec. 36, T12N, R2E could cause an adverse effect to prehistoric site 24 ME 168. Finally, unless protected by mitigation measures, proposed prescribed fire activities in the SE 1/4 Sec. 1, T10N, R2E, would cause an adverse effect to historic mine site 24 ME 184, currently located within the grass burn boundary.

The District has the option of modifying harvest unit E36 and the proposed grass burn boundaries in Sec. 36, T12N, R2E and Sec 1 T10N, R2E so that sites 24 ME 168 and 24 ME 184 lie outside areas of effect from ignition. These mitigation measures would insure the protection of sites from direct, adverse effects of proposed harvesting and prescribed fire treatment activities and would allow the project to proceed through implementation with no consultation with Montana SHPO. Another option would be to complete the 36 CFR 800 process in consultation with SHPO and implement various mitigation measures.

5. Alternative F

As proposed, timber harvesting and skidding operations in proposed cutting unit F41 in the NE 1/4 Sec. 36, T12N, R2E will have an adverse effect on site 24 ME 70. Prescribed fire in the E 1/2 of Sec. 36, T12N, R2E could cause an adverse effect to prehistoric site 24 ME 168.

The District has the option of redesigning the units so there are no effects to these sites or complete 36 CFR 800 process of consulting with Montana SHPO and implementation of mitigation measures.

D. Cumulative Effects

The cumulative result of continued timber harvesting, grazing, road construction, and prescribed fire treatment activities in the Implementation Area, would have an effect on heritage resources but the effect is considered, "not adverse". Road construction can be viewed as increasing the public's access to heritage sites, thereby, increasing the risk of site vandalism. To date however, the Helena National Forest has never identified, nor processed, a criminal case of heritage site vandalism.

Historically speaking, the Implementation Area has been the scene of continuous mineral, livestock, and timber harvesting operations. Seen in this light, proposed treatment activities represent "historic continuity" with those resource extractive activities conducted in the past. Hence, there should be no adverse cumulative effects from activities associated with the Implementation Area.

The Forest Plan requires the integration of heritage resource management into the overall multiple use management effort. Federal laws, policies, and regulations that govern protection and enhancement of significant cultural resources are coordinated with the State Historic Preservation Office which serves the federal agency in an advisory capacity. In addition, the Forest must work closely with the scientific community and Native American tribes to best provide for the protection of the resource. The Helena National Forest requires that NHPA heritage resource inventories be conducted prior to road construction, timber harvesting, or other ground disturbing activities that may affect significant heritage resource properties. Section 106 (NHPA) compliance procedures, require of federal agencies in Part 800 of Title 36, Code of Federal Regulations, must be followed with appropriate consultation with the SHPO and ACHP. Consultation with Native American tribes must also be conducted to insure compliance with AIRFA and NPS regulations.

Assuming Best Management Practices are applied and NHPA implementing regulations in 36 CFR Part 800 followed the implementation of any alternative will be in compliance to those federal laws that govern the Helena National Forest's Heritage Resource Management Program.

13. SPECIAL USES

Effects to special uses are addressed to effects to outfitter and guides, grazing pastures, water transmission and storage facilities and snow survey sites.

A. Effects Common to All Action Alternatives

1. Outfitter/Guide

Only Alternatives D, E, and F propose timber harvest and timber burning within the Slough and Elk Creek drainages. The activity associated with implementing these proposed treatments would displace big game from these general areas during the time the activity is occurring. This would be a short term effect lasting until activity ceased. Hiding cover would be reduced as a result of timber removal that may affect big game distribution. The outfitter should still effectively continue his guiding operation. His permitted use area may need to be modified to compensate for the change in forested cover.

2. Pastures

None of the alternatives contain treatment activities within any of the special use pastures.

3. Water Transmission and Storage Facilities

All action alternatives would affect the waterlines and storage facilities in the Atlanta/Pickfoot drainages. In these cases either a timber burn (Alternatives A, C and E) or timber harvest (Alternatives D and F) are proposed in the location of the waterline and associated livestock watering troughs. These proposed treatments would impact these special uses through damage to the troughs and waterline. The treatment boundaries and associated roads should be altered to avoid these improvements.

4. Snow Survey Sites

Only Alternatives A and D have a potential to affect the the snow survey site located between Mule and Pickfoot Creeks. Alternative A has a timber burn unit located near this site and Alternative D has a large clearcut unit located 1/4 mile west of this snow survey site. Access roads to these treatment units should avoid these sites.

B. Cumulative Effects

There are no cumulative effects associated with these special uses.

POTENTIAL CONFLICTS WITH PLANS AND POLICIES OF OTHER JURISDICTIONS

The following statements are provided to help define the areas of potential differences between the agency proposing this action (U.S. Forest Service) and the policies, management, and enforcement responsibilities of other agencies.

Heritage Resources

The laws and policies that govern cultural resource protection on Federal Lands are coordinated with the State Historic Preservation Office (SHPO) of Montana, who serves in an advisory capacity. The policies for USFS and SHPO are consistent.

Wildlife

The Forest Service and the Montana Department of Fish, Wildlife and Parks work together to manage wildlife, but the missions of the two agencies are different. The Forest Service manages the land and affects wildlife by adjusting cover, forage relationships, or through travel management. The State of Montana manages the animals, and they affect wildlife by adjusting hunting seasons, bag limits, and enforcing other rules that affect the populations of fish and wildlife.

The Forest Service works with the U.S. Fish and Wildlife Service for the recovery of Threatened and Endangered (T&E) Species. The U.S. Fish and Wildlife Service coordinates and oversees all activities relating to T&E Species. The Forest Service consults with the Fish and Wildlife Service when T&E Species may be affected by a proposed project.

Water Quality

Section 313 of the Clean Water Act requires Federal Agencies to comply with all Federal, State, interstate and local requirements, administrative authority, and process and sanctions with respect to the control and abatement of water pollution. Executive Order 12088 also requires the Forest Service to meet the requirements of the Act.

All action alternatives will comply with the Clean Water Act and Montana State Water Quality Standards. These alternatives will incorporate reasonable Soil and Water Conservation Practices, avoid channel degradation and comply with the Forest Plan.

Air Quality

The prescribed burning of harvest units under all Alternatives has the greatest potential on local air quality. This activity is conducted in accordance with the State Air Quality guidelines administered by the Montana Airshed Committee, a group made up of industry, State and Federal agencies, and local Health Department representatives.

Potential conflicts occasionally exist between the National Forest concerns for meeting land management goals and the commitments of the State Agencies to clean air.

Other sources of potential conflict exist between private land owners within Montana, State land management agencies, and other adjoining National Forests competing for the limited number of suitable burning days.

PROBABLE ENVIRONMENTAL EFFECTS THAT CANNOT BE AVOIDED

Implementation of any alternatives would inevitably result in some adverse environmental effects. The severity of the effects can be minimized by adhering to the features of the alternatives such as the Best Management Practices. If management activities occur, however, some effects cannot be avoided. Even the No Action alternative has effects.

Heritage Resources

There is no assurance that every cultural resource site would be located in advance of all planned management activities. Some ground disturbing activity may affect an undiscovered historic and prehistoric site. Sites discovered in this manner would be immediately protected from further disturbance.

Scenic Resources

The introduction of silvicultural treatments, prescribed burning and new roads would add a variety of line, form, color and texture to the landscape. Recreation visitors would see a modified forest in the near foreground, middle ground and background where harvest and road construction is implemented. Subsequent vegetative recovery would soften the impact, while the introduced variety increases the landscape's ability to absorb future disturbance.

Wildlife

All of the action alternatives will have an effect on the cover:forage relationships in the project area. Alternatives that require road building could possibly provide improved access during the hunting season. Thus, habitat security would be reduced and big game vulnerability would be increased in all action alternatives. Old growth dependent wildlife species would experience fluctuations in their populations as successional conditions change.

Air Quality

Temporary seasonal effects on air quality are unavoidable under any of the action alternatives. Prescribed fire is an integral part of preparation of the site for reforestation, and will be scheduled when air dispersal patterns are good.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES

An irreversible commitment of resources refers to the loss of production or use of a resource due to a land use decision, that, once executed, cannot be changed. An irretrievable commitment of resources applies to losses of production or use of renewable resources for a period of time.

Soil Productivity

Best Management Practices would be used to avoid soil productivity losses from timber harvesting and associated road/skid trail construction. Road construction for timber harvesting access is proposed in all action alternatives. Because the roads would be temporary, they would not constitute an irreversible commitment of a resource.

Vegetation

Timber harvest would change plant succession, stand development and species composition. Harvesting of old growth timber would reduce the available old growth habitat for an extended period of time and would constitute an irreversible commitment of resources.

Air Quality

The impact of prescribed burning and road dust would have temporary seasonal impacts on the air quality in all alternatives except Alternative B - No Action.

Scenic Resources

Irreversible changes in the existing appearance of the landscape would occur under the action alternatives. These changes would become progressively less noticeable as revegetation occurs in harvested areas and along roads.

Wildlife

The loss or modification of habitat for certain wildlife species is an irreversible commitment of resources. As vegetation recovers, this habitat would recover. However the time frame for this to occur may be as long as several decades for mature and old growth related species.

Heritage Resources

Any activity that would disturb a cultural resource is an irreversible commitment.

Roadless Areas

Alternatives A, C, D and F would temporarily alter the remoteness, solitude and primitive recreational opportunity of the Cayuse Mountain, Irish Gulch and Camas Creek Roadless Areas. Also, the natural integrity and apparent naturalness would be affected even though only temporary roads are proposed with Alternatives A, C (Camas Creek Roadless Area) and D. Alternative F would fracture the Irish Gulch Roadless Area to the point that it would not meet the minimum acreage requirement for eligibility as a roadless area.

SUMMARY OF THE RELATIONSHIP BETWEEN SHORT TERM USES AND LONG TERM PRODUCTIVITY

Short term uses are those uses that generally occur annually. Long term productivity refers to the ability of the land to produce a continuous supply of a resource.

Water Quality

The duration of the effects of timber management on the water resource is highly variable and dependent on land an vegetation types. Stream channel conditions may be altered as a consequence of short term direct and indirect effects of management activities. Erosion and sedimentation from road development and increased peak flows may occur even after vegetative recovery, although at a lesser degree than initially. These water yield and sedimentation effects are long term because they may not fully recover to natural rates.

Wildlife

Key habitat requirements for wildlife species include feeding habitat or foraging areas interspersed with nesting or denning habitat and thermal and hiding cover. As the feeding habitats experience successional changes and reforestation, they will again provide cover. The appropriate scheduling of timber harvest can provide and sustain a mosaic of cover and feeding habitat.

Vegetation

Managed stands produce a higher volume through time that unmanaged stands. Regeneration of desired fast-growing species, planting of genetically selected trees, stocking control to reduce competition and to improve growth of individual trees, and intermediate treatments to maintain the health and vigor of stands are silvicultural means of maintaining the long term yield of forest stands.

In the short term, harvesting stands that are a high risk of mortality captures volume that would otherwise be lost. Timely reforestation puts the land back into a productive timber-growing condition.

Air Quality

The temporary impacts of smoke from prescribed debris burning and road dust from vehicles associated with proposed activities would have minor, short term effects on visual quality and recreation use. The short term impacts are traded for long term increased site productivity.

SPECIFICALLY REQUIRED DISCLOSURES

Effects of Alternatives on Social Groups

There would be no overall differences between alternatives in effects on minorities, Native American Indians, women, of the civil liberties of any American citizen.

Effect on Floodplains and Wetlands

There are bogs, ponds, and small lakes within the decision area. These wetlands should not experience any significant adverse effects from management activities. Management activities designed to protect these resources conform with the federal regulations for floodplains (Executive Order 11900) and wetlands (Executive Order 11990).

Effects of Alternatives on Threatened and Endangered Species

The US Fish and Wildlife Service (FWS) lists the grizzly bear (threatened) and gray wolf (endangered) as residents and the bald eagle ((endangered), and peregrine falcon (endangered) as migrants to the Helena National Forest. Neither the grizzly bear, gray wolf, not peregrine falcon are known to occur within the Implementation Area. There are no known bald eagle nesting sites nor are any expected to occur here. However, bald eagles may visit the area temporarily from nest sites outside the Implementation Area.

Energy Requirements and Conservation Potential of Alternatives

The energy required to implement the alternatives in terms of petroleum products would be insignificant, when viewed in light of the production costs and the effects of the national and worldwide petroleum reserves.

Effects of Alternatives on Prime Rangeland, Forest Land, and Farm Land

The alternatives presented are in compliance with Federal Regulations for prime lands. The definition of prime forest land does not apply to lands within the National Forests. The decision area does not contain any prime farm lands or rangelands. In all alternatives, Federal lands would be managed with the appropriate consideration to the effects on adjacent lands.

CHAPTER V–

RESPONSE TO PUBLIC COMMENTS

CHAPTER V - RESPONSE TO PUBLIC COMMENTS

CHANGES BETWEEN DRAFT AND FINAL

This chapter has been added since the publication of the DEIS.

INTRODUCTION

This chapter discusses involvement and consultation with a variety of people during the analysis and formulation of the Draft Environmental Impact Statement (DEIS) and the Final Environmental Impact Statement (FEIS). More specifically, this chapter includes:

- A summary of public participation prior to the DEIS (from Chapter II in the DEIS).
- A summary of public participation between the DEIS and the FEIS.
- A brief summary of public comment on the DEIS.
- A summary of individual comments on the DEIS and our responses to those comments.
- A listing of respondents who submitted written comments on the DEIS.
- Copies of letters from elected officials and federal or state agencies.

The primary purpose of public participation is to hear what individuals and organizations have to say about our management proposals. This process greatly assists the agency in doing a fair and complete job of analyzing and documenting effects which lead to a better decision.

Public comments received were analyzed in preparation for development of the FEIS. Results of this work are documented in a *content analysis summary* which is available for review in the Project File. The FEIS was revised, where appropriate, to respond to substantive comments received from the public and other agencies.

Every attempt was made to accurately represent each substantive comment. Similar viewpoints were grouped together and responded to by the Forest Service Interdisciplinary (ID) Team. General comments, including those which simply supported one alternative or another, are also summarized in this chapter. Some comments noted minor technical errors which have been corrected in the FEIS without specific identification in this chapter.

PUBLIC PARTICIPATION PRIOR TO PUBLICATION OF THE DEIS

Formal scoping for the DEIS began with the publication of the Notice of Intent to Prepare an Environmental Impact Statement (NOI) in the Federal Register on July 20, 1993. The NOI presented a summary of the Proposed Action, the purpose and need for the action, tentative environmental issues and other supplementary information. It also expressed the importance of public participation and input, particularly during the initial scoping period and, later, during the period provided for comment on the DEIS.

Public input was also solicited at three Open Houses conducted in July, 1993 in Helena, Townsend and White Sulphur Springs, Montana. Those attending represented a wide range of interests. Oral and written comments were received both during and after the Open Houses. These comments are available for review in the Project File at the Townsend Ranger Station and the Helena Forest Supervisor's Office.

Numerous news articles appeared in local newspapers to inform people of the proposal and to encourage the public's participation in the project. Informal meetings and field trips with individuals and groups were held throughout the scoping process.

Letters were sent to interested parties relative to the alternative formulation process. The intent was to inform the public on the status of the alternative development and to gain additional information on alternatives they would like to see addressed in the DEIS.

All comments received prior to September 9, 1993, were used to identify issues for the DEIS.

PUBLIC PARTICIPATION BETWEEN THE DEIS AND THE FEIS

The Wagner/Atlanta DEIS was released for public review and comment on January 4, 1995. The notice of availability of the DEIS was published in the Federal Register on February 3, 1995. The formal comment period closed on March 20, 1995.

Since publication of the DEIS, officials from the Townsend Ranger District and the Helena National Forest Supervisor's Office have been in communication with various individuals, groups, businesses, other government agencies and elected officials concerning this proposal. These contacts have included phone calls, open-house meetings, personal communications, letters, and newspaper articles. They have helped in keeping interested parties informed of the current status of the FEIS.

BRIEF SUMMARY OF PUBLIC COMMENT ON THE DEIS

Forty-two responses were received from 40 individuals and groups. The letters and comment forms were reviewed and substantive comments were coded and double-checked for coding accuracy. Comments were entered into a database by codes reflecting subjects and categories, all of which has been made a part of the Project File.

Several areas of concern surfaced through the content analysis. They are General (NEPA Process, Forest Plan, Ecosystem Management), Soil, Water and Air, Nonforest Vegetation, Forest Vegetation, Harvest Techniques, Fisheries, Wildlife, TES/MIS, Recreation, Roads, Roadless Areas, Special Uses, and Economics. A detailed summary of the categorized comments is available for review in the Project File at the Townsend Ranger District.

Forty of the letters/comment forms received were from within the state of Montana. Of those, 20 of the respondents were from Helena. The remaining 20 letters from Montana respondents included; five from Townsend and White Sulphur Springs each, two from Great Falls, Bozeman and Deerlodge each, and one each from Willow Creek, Livingston, Boulder, and Missoula. The two letters from outside of Montana came from New Mexico and Colorado.

Respondents were grouped by affiliation as noted in their letters or comment cards. Respondents included the Meagher County Commissioners, the Environmental Protection Agency, the Montana Department of Fish, Wildlife and Parks, 14 organizations and 26 individuals.

RESPONSE TO PUBLIC COMMENT

The following is a listing of substantive comments received on the DEIS. The comments are organized by resource. Most of the comments written below are direct quotes; some have been grouped together and some are paraphrased. Every attempt was made to accurately capture each substantive comment and display it.

Each comment is followed by a number(s) in parentheses. The numbers correspond to the number given to each letter received as shown in the List of Respondents included in this Chapter. The Forest Service response follows each comment or group of comments in italics.

A. GENERAL

Comments assigned to this category include a variety of concerns related to legal processes (National Forest Management Act and National Environmental Policy Act), application of ecosystem management, consistency with the Helena Forest Plan, adequacy and clarity of the Draft Environmental Impact Statement and statements of preference or rejection of various aspects of the proposal and analysis. Many of the expressions of acceptance or rejection lacked supporting rationale for the expressions; others were specific as to why they liked or disliked certain features.

1. Comments Relative to the Application of Ecosystem Management

• Several people commented on the appropriateness of the Proposed Action and the alternatives in achieving definable and supportable ecosystem management including; a concern that ecosystem management was replacing the multiple use agenda laid out for the National Forest by Congress and that "Vegetation Treatment Projects" such as this one are merely clever disguises for the same old destructive logging and roading practices of the past. **(letters #9, 3)**

> *Chapter I, Section II, provides a discussion of the relationship of the proposal to the Helena Forest Plan and the Big Belts Landscape Analysis. The discussion addresses the concepts that the purpose and need for action includes sustaining a combination of resources and that producing commodity outputs are compatible with ecosystem management. Our view is that application of ecosystem management principles actually facilitate the management of National Forest lands consistent with the Multiple Use-Sustained Yield Act and other laws.*

• Landscape ecology has been recognized for a mere decade and already its unproven theories are being implemented on a large scale in the Wagner-Atlanta proposal. The Forest Plan and the Regional Guide will need to be amended to implement large EM projects such as Wagner-Atlanta. **(letter #40)**

• To enter all the watersheds at once with no previous experience as to its effects may create more problems than it solves. Unmanaged areas should be left alone until there is evidence that the proposed approach is any better than traditional management. **(letter #40)**

> *Both of the above comments suggest that this project is something of an experimentation with ecosystem management and that environmental effects and risks are unknown. Chapters I and III provide discussions on the the purpose and need for the action and the aims of ecosystem management. The environmental effects are related mainly to building roads, harvesting trees and applying prescribed fire in forested and nonforested stands. The effects of these actions are usually highly predictable and are disclosed in Chapter IV. The relatively large area proposed for treatment provides a clearer analysis of the effects over a total landscape than might be obvious when analyses are conducted over a smaller landscape. We believe that the actions being considered are needed to achieve the management area goals of the Helena Forest Plan. Site specific exceptions may be required to permit departure from Forest Plan standards (open road density, for example). We do not envision a need to amend either the Forest Plan or Regional Guide.*

• The more area treated, the greater the movement towards the desired vegetative conditions for both forested and nonforested areas. **(letter #12)**

This appears to be true. Acres restored to desired vegetative conditions will be one of the factors that the Responsible Official will consider in selecting an alternative for implementation.

- The most important principle of ecosystem management is connecting biological corridors. **(letter #36)**

Maintenance of biological corridors is one of many components of ecosystem management considerations. We do not agree that it is the most important.

- The parameters and indicators that define the health of a forested ecosystem need to be included in the FEIS so the public can understand the magnitude of the alleged forest health problem in the Big Belts. **(letter #40)**

The nonforest vegetation and forest vegetation sections of Chapter III discuss the historical and current vegetative conditions in detail. The unnatural stocking and age structures and resulting conditions relative to productivity, susceptibility to fire, insects and disease, etc. are all discussed sufficiently to display the forest health problems and difficulty of sustaining the stands.

2. Comments Related to Forest Plan Compliance

- Several respondents felt the project was inconsistent with the Helena Forest Plan and lacks any direction to manage the structure and composition of forested stands outside the suitable timber management areas. There is little justification for logging and road construction outside the suitable timber base. One respondent specifically questioned how timber harvest could be allowed on L-1, L-2 and M-1 Management Areas. In addition, timber harvest and prescribed burning on W-2 lands (unsuitable for timber management) must optimize wildlife habitat. Analyses must assess impacts from loss of cover due to these actions. **(letters #39, 40)**

Vegetative treatments were designed to restore forested and nonforested areas to stimulate more natural, healthy, and sustainable vegetative conditions, regardless of the management area allocation. We agree that timber harvest, whether employed on suitable or unsuitable lands, must be consistent with the management area goals of the Forest Plan.

- The Helena National Forest is ignoring the Forest Plan Direction that timber stand openings created by even-aged management will normally be 40 acres or less. **(letter #39)**

If the selected alternative contains treatment units on lands suitable for timber management that will create openings over 40 acres, Regional Forester approval will be obtained prior to signing the Record of Decision.

- The Forest is ignoring the Forest Plan Standards for open road densities, old growth, management area prescriptions, riparian management, snag management, hiding cover, and opening size. Forest plan amendments are required to allow these violations. **(letter #39)**

Consistency with Forest Plan standards are assessed during the effects analysis. Where alternatives are found to be inconsistent with any standard, either mitigation is identified to achieve consistency or a site specific exception to that standard will be required.

- Riparian areas have not been delineated prior to the proposal as required by the Forest Plan. If harvest is planned in riparian areas, how will the 240 year required rotation age be implemented?

Riparian areas have been delineated as part of the Helena National Forest's valley bottom inventory, classification, and mapping efforts. Adherence to all aspects of the Montana Streamside Management Zone Act will insure that the 240 year rotation will be achieved.

• Analysis must ensure that 35 percent thermal cover is maintained on L-2 lands following timber harvest. **(letter 39)**

The Helena Forest Plan standard requires 25 percent thermal cover, where available, on identified winter range. Compliance with this standard has been addressed in the FEIS.

3. Comments Related to the Big Belts Landscape Analysis

A couple of respondents challenged the legality and conclusions of the Big Belts Landscape Analysis. Comments included:

• The Big Belts Integrated Resource Assessment (Landscape Analysis) was done without complying with NEPA requirements for public review, formal consultation, and other Federal and State agency input and critique. Therefore, decisions related to desired conditions that are the basis for the purpose and need for the project were internally derived by the Helena National Forest without the benefit of review by other natural resource experts and the public. **(letter #40)**

• There was no NEPA process developed that had experts evaluate the various ecosystems and ascertain their processes and the limits and opportunities for ecosystem management activities. The Big Belts IRA was not open to external review, so the impact of roads on ecosystem processes could not be critiqued by the public. **(letters #39, 40)**

The Big Belts Landscape Analysis was an intensive analysis conducted from November, 1991, to December, 1992. Simply stated, the analysis identified and documented both the historical ecosystem patterns of the Big Belts and the existing conditions and integrated and refined the desired conditions and identified possible management practices to implement the management area goals defined in the Forest Plan. The analysis, although it did result in refinements and findings, did not make management decisions regarding implementation of the Forest Plan. The Wagner/Atlanta Vegetation Treatment proposal and other specific management actions suggested by the Big Belts analysis will be subject to the NEPA process, as appropriate.

4. Comments Relating to the Purpose and Need for the Action.

Several respondents questioned various aspects of the purpose and need for the project. Others expressed support for the purpose and need. Specific comments included:

• Implementation of a 150 year rotation for Ecological Land Unit (ELU) 4 is never substantiated by a summary of the Natural Range of Variation (NRV) analysis. What information was used to determine that a 150 year fire rotation represents the maximum age range for ELU 4? **(letter #39)**

The proposed treatments are designed to restore forested stands to historical composition, structure, and function. It is not suggested that stands will be managed on a 150 year rotation. In fact, treatments on the warm/dry sites will, in the long term, enhance the maintenance and sustainability of old growth characteristics that were common to this habitat type. Analysis of stand origin dates in the cool/moist habitats clearly suggest that stand replacement fires naturally occurred at 130-150 year intervals.

• The NRV is not clearly defined. The FEIS should define how the NRV was determined and the level of accuracy of the analysis. In addition the DEIS never provided any data or literature citations or rationale to support the need for harvesting in the warm/dry Douglas-fir stands in ELU 4. **(letter #39)**

The historical and existing conditions for both the dry and the mesic Douglas-fir types in ELU 4 are discussed in the Forest Vegetation section of the FEIS. The warm/dry habitat types display the greatest departure from natural conditions due to the excessive growth of young trees that have not been

periodically thinned by natural fire ignitions. Stand replacement wildfires were not common on these sites. Due to several decades of aggressive fire suppression, many of these stands are now subject to high intensity stand replacement wildfires. The purpose for treating these stands now is to reduce understory fuel loadings to more natural (historical) conditions.

- The FEIS needs to demonstrate how wildlife needs were instrumental in selection of units to be harvested and burned in this entry period. **(letter #39)**

The Proposed Action was developed to focus on the desired conditions for forested and nonforested vegetation. The desired conditions were defined to integrate the needs of all resources, uses, and activities. This "integrated" concept involved compromises. Consequently, it is not likely that any single resource will be optimized in defining an integrated desired condition. Alternative C was developed in response to a strong concern for optimizing elk security. However, optimizing elk security may incorporate design features that are unfavorable to other wildlife species.

5. Comments Relating to Development of Alternatives and the Range of Alternatives.

Several respondents either questioned the design features of the alternatives or the adequacy of the range of alternatives analyzed in the DEIS. Comments included:

- There are no alternatives which limit timber harvest to currently suitable lands as defined by the Forest Plan. **(letter 39)**

Suitability for timber management was not a strong influence in developing the proposal. Instead, the focus of the proposal is to restore, improve, and maintain healthy forested and nonforested ecosystems. Timber management practices, where proposed, are merely tools to achieve the overall purpose and need for the project.

- Restoration projects should be included in all alternatives to meet Water Quality Act standards. No degradation is allowable. **(letter #40)**

Mitigation, if needed, must be applied to any implementation action to assure maintenance of beneficial uses and compliance with State and Federal water quality standards.

- No alternative was developed to allow natural fire ignitions to burn under certain parameters. This should have been developed as a cost effective management proposal. **(letter #40)**

Reliance upon natural ignitions is probably not technologically feasible nor socially acceptable at this time. The unnatural stand conditions that exist would normally burn so intensely that risks to life and property would be unacceptable.

- Treatment areas for the Proposed Action (Alternative A) selected areas that displayed the greatest departure from desired vegetative conditions. Therefore, the treatment areas should be targeted for treatment in all action alternatives. **(letter #38)**

Most areas within the Implementation Area would benefit from treatment. The alternatives were developed to respond to significant issues generated by the Proposed Action and represent various ways that that the purpose and need could be achieved. The alternatives were consciously not constrained by either the treatment areas or treatment methods contained in the Proposed Action.

- The FEIS should contain no more than four alternatives. The difference between alternatives is difficult to track when the array of alternatives is greater than four. **(letter #7)**

The alternatives were each developed to respond to one or more of the significant issues identified during initial scoping. We believe that limiting the analysis to four alternatives would not be responsive to the issues that were raised.

- The Forest Service should review and evaluate the rationale for selecting treatment units and methods and combine the best of the alternatives to create a preferred alternative. **(letter #38)**

The alternatives analyzed in the DEIS were intentionally designed to focus on specific issues to maintain a clear distinction between alternatives. The selected alternative may very well combine features of several of the alternatives.

- Action alternatives should be developed with criteria common to all action alternatives and some criteria more restrictive in one alternative than another to facilitate alternative development and displaying the differences in environmental effects. **(letter #7)**

Chapter II contains a section listing Features Common to all Action Alternatives. Individual alternatives were then developed to respond to specific issues while still achieving the purpose and need for the project.

- The preferred alternative should focus on forest health and economic returns. If this area is not scheduled for reentry for 25 years, then all areas with high mortality should be addressed. **(letter #19)**

Forest health and economic returns will be considerations in the decision of what action, if any, is to be implemented. Other landscape constraints such as water quality, wildlife needs, and social acceptance prohibit treating all stands that are currently in need of treatment in this entry.

- Because of the controversial nature of ecosystem management, an alternative should be prepared that applies traditional management principles to the Implementation Area. This is the alternative that implements the Forest Plan as it was developed and analyzed under NEPA. **(letters #3, 40)**

Alternative H was developed to treat the Implementation Area as we have traditionally done. This alternative was dropped from detailed consideration when the interdisciplinary team concluded that conventional treatments and entry frequencies would not adequately achieve the purpose and need for the project. A more detailed explanation of the rationale for not considering this alternative is contained in Chapter II (Alternatives Identified But Eliminated From Detailed Consideration).

- An alternative is needed that proposes less activities than any of the action alternatives. **(letter #4)**

A no action alternative is analyzed. Development of alternatives that propose significantly less treatment than the action alternatives would fail to achieve the purpose and need for action.

- An alternative should be selected that captures more timber volume in a shorter time because the short term impact of additional harvesting far outweighs the environmental problems associated with major forest fires. **(letter #6)**

The existing alternatives vary substantially in the volume of timber produced. Any alternatives suggesting substantially more timber harvest would likely be both environmentally and socially unacceptable.

- A "reclamation alternative" should be developed that closes and revegetates most existing roads, cleans up mine waste dumps and placer mine spoil piles and excludes logging and roading. **(letter #23)**

There is merit to considering a number of reclamation activities in the Implementation Area. However, the alternative as suggested contributes nothing to the purpose and need of the proposal and is, therefore, outside the scope of this project.

6. Comments Related to Analyses and Disclosure of Environmental Effects.

Several respondents expressed concerns related to either the adequacy of the analyses or effects determinations. Some provided specific suggestions for addressing environmental effects in the FEIS. Comments included:

• Table II-6 (Alternative Comparison Table) should include watershed, stream channel and fishery effects. **(letter #17)**

The differences between alternatives relative to these effects are so small that displaying them in the alternative comparison table is of little value. However, we have made some minor rewrites in the detailed analyses in Chapter IV to clarify other points raised in the comments to the DEIS.

• The forest health issue (Issue #5) could be changed to Forest and Watershed Health". Topics to be evaluated for this issue would be percent increase in water yield, percent increase in sediment delivery, stream channel effects in the Implementation Area, and stream channel effects downstream of the Implementation Area. **(letter #40)**

The evaluation parameters are valid and each are addressed in Chapter IV of the FEIS. We agree that watershed health is an important component of a healthy ecosystem but the issue identified in Issue 5 was specific to the effectiveness of the Proposed Action in dealing with the vegetative health component. We have not redefined this issue in the FEIS.

• The FEIS should include the change in ecosystem properties impacted by private land changes to the historic condition as part of the cumulative effects analysis. **(letter #40)**

Many of the components of the existing environment described in Chapter III are related to land practices on adjacent private lands. The analysis failed to identify any reasonably foreseeable actions on private land that needed to be assessed as a cumulative effect.

• All alternatives have some level of risk associated with the occurrence of large wildfires. The conclusions may overstate both the reduction in these risks from implementation of the action alternatives and the increased risks of not taking any vegetative treatment actions. **(letters #17, 35)**

We have rewritten portions of the effects analysis in Chapter IV. Given the unpredictable nature of when wildfire events will occur we do not want to imply that risks will change dramatically with the initial treatment. We remain confident, however, that risks will decrease greatly once historical conditions are restored.

• Downstream effects on less resilient channel types were not discussed in the document. **(letter #17)**

Any direct or indirect effects below the Forest boundary are expected to be minimal. This has been addressed in the FEIS.

• There was no analysis provided in the DEIS on the impact of the management goal of eliminating natural fire, particularly stand-replacing burns from the Implementation Area. **(letter #39)**

We do not suggest that is is realistic or desirable to eliminate fire from the ecosystem. An important part of the need for the Proposed Action is to restore stands to historical conditions where wildfires will not

burn at a greater intensity than they would under natural regimes. However, we will continue to aggressively attack and suppress all fires threatening life or property.

● The FEIS should contain maps displaying elk security areas for each alternative. **(letter #27)**

This has been done.

7. Comments Related to Preferred Alternatives.

Most respondents expressed either a clear preference or rejection of one or more of the alternatives discussed in the DEIS. Several people suggested a preference for combining features of two or more alternatives. The generalized comments included:

● Respondents expressed strong preferences for implementing an alternative that did not construct any new roads. Most of these respondents also expressed support for closing more existing roads. Furthermore, respondents stated opposition to any road construction within roadless areas. Most of these comments also opposed both timber harvest and prescribed burning in the three roadless areas. Several of the respondents are clearly opposed to any additional roading or timber harvest anywhere within the Implementation Area. **(letters # 1, 2, 5, 8, 10, 14, 15, 16, 21, 23, 27, 28, 30, 34, 36, 37, 39 and 40).**

The expressions of preference are acknowledged. We are well aware that many people share these values. Any decision must consider these desires along with opposing views.

B. SOIL, WATER, and AIR

1. Comments Relative to Alternatives Presented.

● Respondents commented that there are alternatives presented that fail to adequately protect important soil and water resources within and below the Implementation Area. **(letter #17)**

The direct, indirect and cumulative effects to the water resource were displayed on pages IV 11-14 of the DEIS. As indicated, several alternatives show that the physical integrity of the stream would not be maintained and beneficial uses would not be protected. Mitigation measures are proposed which would be sufficient to avoid the expected effects (IV-14 of DEIS).

2. Comments Related to the Effects Analysis of Soil, Water and Air

Numerous respondents questioned the methodology and the analysis used to determine effects to soil, water and air.

● How was the determination made that treating 6299 acres significantly reduce the risk of catastrophic events on watersheds? **(letter #17)**

Chapter IV (IV 25-26, DEIS) described the direct and indirect effects to forest health by alternative. As noted, Alternative B which does not use timber harvest to manipulate forest stands would result in the continued development of ladder fuels in the warm dry forest types. As a result the potential for stand replacing crown fires increases in a forest type that has not evolved with stand replacing fires. Tables II-1 through II-5 with accompanying graphs displayed the amount of warm dry forest types treated by each alternative (anywhere from 26 to 47 %). To the extent that these alternatives treat the warm dry forests and to some extent the cool moist forests the risk of uncharacteristic stand replacing fires is reduced. It should be kept in mind that the risk of fire may not be dramatically reduced. However the duration and intensity of fire in the treated areas would be reduced resulting in restoration of historic processes. In addition see response to Forest Health. As noted on page IV-13 of the FEIS, additional

analysis was completed showing the acres treated by watershed for the warm/dry and cool moist forest types and grasslands. This analysis aided in assessing risk from fire for each alternative.

- Effects on less resilient channel types below the Implementation Area were not discussed in detail in the document. **(letter #17)**

Chapter III (III-11) describes the area under consideration in this analysis. Where appropriate (Vermont Creek for example) analysis was carried below the Forest boundary. Field investigations indicated that streams below the Implementation Area are as a whole more resilient than those on the forest.

- A respondent had difficulties understanding effects to Alternative B with AMP revisions in relation to the other alternatives and AMP revisions. **(letter #35)**

As stated in the cumulative effects there will be a shift away from low similarity to moderate and high similarity because of the allotment management plans. This movement toward moderate and high similarity will be the same in all alternatives. What does change is the amount of vegetation treated and thus the risk of incurring a significant fire/flood event. See response to Effects Analysis above. In addition, further analysis was completed projecting miles of stream going from low to moderate and from moderate to high similarity by watershed. Summary is in Chapter IV of the FEIS with detailed analysis in the project file.

- Two respondents felt that modeling results of sediment and water yield should be included in the FEIS. **(letters #40, 35)**

As noted on IV-12 of the DEIS, what is important is the linkage of these modeling results and other water variables to the ability of the stream to transport sediment and changes that will occur to the stream channel. The effects of increased water and sediment yields are disclosed on pages IV 11-14 of the DEIS. Modeling results are in the Project File and are available to anyone upon request.

- One respondent felt uncomfortable with risk assessment for the no action alternative and requested a more detailed explanation and linkage of water and sediment yields, sediment transport, and canopy coverage with no change, extensive fire and harvesting activities. **(letter #35)**

Linkages as to how streams within the analysis area respond to peak flow increases are discussed in Chapter III under the discussion for ecological landscape units (III 5-11). Further discussion of processes is contained in the Project File as noted on III-13 and is available on request. In addition see response under effects analysis above. Also, as noted above, additional analysis was completed by watershed to aid in assessing the risk form fire for each alternative.

- Watershed effects should have been included as a significant issue and should have been discussed in the summary. **(letters #35, 17)**

As stated on page II-5 other issues were identified during the scoping process including watershed issues. However, the relative difference between the anticipated effects regarding this issue was not enough to provide a clear basis for choice among alternatives. Consequently a specific alternative was not developed to respond to this issue. This issue is important however and the affected water resource environment is displayed in Chapter III and the environmental effects to this resource are disclosed in Chapter IV.

- Please provide further information showing how stream channel similarity ratings are expected to go from low to moderate or high given the amount of activity in the Implementation Area. **(letter #38)**

As noted on page IV-13 improvements in stream channel similarity ratings should occur as a result of proposed revisions in the allotment management plans. Additional analysis was completed showing the miles of stream going from low to moderate and from moderate to high similarity and are in the Project File with a summary provided in Chapter IV of the FEIS.

3. Comments Related to Erosion/Sensitive Soils

Numerous respondents raised concerns with the issue of erosion and sensitive soils.

• The document potentially overstates the expected recovery as a result of AMP revisions. **(letter #17)**

Additional analysis was completed showing the expected recovery due to AMP revisions and are available in the Project File with a summary provided in Chapter IV of the FEIS. This was analyzed for both the short and long term. This analysis revealed that there are stream segments that are not expected to recover even in the long term as a result of the AMP revision alone.

• One respondent inquired as to whether there were extensive downcut channels since significant recovery was projected. **(letter #17)**

While there will be significant recovery, as mentioned above, there are stream segments that are not expected to recover even in the long term as a result of AMP revisions alone. As mentioned above this analysis is in the Project File with a summary provided in Chapter IV of the FEIS.

• I am somewhat surprised that the detrimental soil disturbance rating in Chapter IV of Alternative A and F are both described as moderate. **(letter #38)**

The detrimental soil disturbance rating or "index" is intended to assess the relative potential soil disturbance impact of each alternative incidental to the forested vegetation treatments (Chapter IV, page 3, second paragraph). Potential soil disturbance effects related to roads are addressed by alternative (Chapter IV, pages 5 through 10).

Alternative F would likely generate detrimental soil disturbance comparable to Alternative A within the treatment units. It involves no new road construction and 21.2 miles of road stabilization. Alternative A would require 15.7 miles of road construction which would be returned to contour following use. It also closes a minor amount of existing roads (1.84 miles). As discussed in the effects analysis (Chapter 4, pages 5 and 6) a short term alteration of hydrologic function and soil conditions would occur if Alternative A were selected. No such short term alteration would occur should Alternative F be selected. Soil productivity loss would be minimal following recontouring of the new road prisms in Alternative A.

• I am somewhat surprised that Alternative C has a lower soil disturbance rating (Page IV-6) than Alternative F (page IV-10). **(letter #38)**

Based on probable detrimental soil disturbance incidental to forest treatments alone Alternative C would likely generate less detrimental soil disturbance than Alternative F. Alternative C would require some new roads (7.9 miles) be constructed (some of which would be recontoured with little or no long term effects) and 26.7 miles of road would be closed and stabilized with some benefit to watershed. Alternative F would involve no new road construction and would stabilize 21.2 miles of existing road. From a soil disturbance standpoint alone Alternatives C and F are somewhat comparable.

• A respondent expressed concern that the preferred alternative will degrade perennial streams that are already impacted. **(letter #40)**

There is no preferred alternative identified in the DEIS. The rationale for selection of an alternative or combination of alternatives with their associated mitigation measures will be documented extensively in the Record of Decision.

• Recommend mitigation measures outlined on page IV-14 in Alternatives E and Alternative F should be included in the alternative. **(letter #38)**

If Alternative E or F is selected inclusion of mitigation measures will be documented in the Record of Decision. Effects of these alternatives are displayed in Chapter IV, both with and without mitigation measures applied.

• Why is it Alternative E would produce more sediment than Alternative F for Atlanta Creek given that there is more activity planned in Alternative F. **(letter #38).**

The difference comes in the treatment of units between alternatives. Unit E1 which is a burn has a basic erosion rate of 550 tons per square mile per year (per WATSED model) whereas unit F1 is a selection harvest unit and has a basic erosion rate of 340 tons per square mile per year. This results in more sediment being produced in Alternative E.

4. Comments Relative to Water Quality

Concerns focusing on the issue of water quality were raised by numerous respondents.

• Provide clarification of the term "Similarity Level" and an explanation of criteria used to establish ratings. **(letter #38)**

Definition and criteria will be included in the Glossary.

• A respondent was hopeful that selection of alternative will consider sediment and water yields for each drainage and will consider impacts downstream from the Implementation Area. **(letter #17)**

Page IV-12 of the DEIS, describes the drainages that were modeled for water and sediment yield and the rationale behind that decision. The analysis area for watershed effects is described in Chapter III. Where appropriate the analysis did extend below the Forest boundary.

• General statements that indicate the physical integrity of the stream would not be maintained and beneficial uses would not be protected by implementing the no action alternative should offer further information about trade-offs, or be removed completely. **(letter #17)**

As stated on page IV-13 of the DEIS, to the extent that the No-Action Alternative takes no action which aids in precluding significant environmental change due to insects, disease, wildfire and other natural processes the streams within the Implementation Area stand a greater chance of undergoing significant changes in stream channel morphology. While it is recognized in the literature that not all fire has a detrimental effect, (Minshall et al. 1991) it is also well documented that fire can dramatically increase runoff and fine sediment levels and adversely affect habitat conditions for all life stages of trout (Minshall et al. 1990). This is also demonstrated by several fires on the Helena National Forest. How streams respond to peak flow increases within the Implementation Area is disclosed in Chapter III under the discussion of ecological landscape units. In addition to this see response to Effects Analysis above.

• The statement that there will be no measurable declines in rainbow trout reproductive success for Vermont Creek, seems to conflict with the statement that any additional fine sediment intrusion into the gravel matrix of spawning habitat could further suppress or eliminate survival of rainbow embryos. **(letter #38)**

Because current sediment levels in lower Vermont Creek are so highly elevated (51%), response equations to predict egg survival for the rainbow trout species under the worse case scenario for this drainage (Alt E) depict a decline of only 0.002%. Such figures for our purposes of gauging incubation success are considered "immeasurable". Yet, because of current high levels of sediment (51%) in spawning substrata that suppress incubation success to less than 0.1%, we believe any additional sediment loading can only serve to cumulatively jeopardize fry production, a major limiting factor at present for the rainbow population.

5. Comments Relative to Effects of Catastrophic Events on Watersheds.

• One respondent felt that there was inadequate information to address effects due to fire/flood on an individual drainage basis. **(letter #17)**

Additional analysis will estimate the reduction in "risk" to individual drainages due to the amount treated. As noted above it should be kept in mind that the "risk" of fire may not be dramatically reduced. However, the duration and intensity of fire in the treated area would be reduced in the treated area resulting in reduced effects on the watershed. As noted above, additional analysis contains acres treated in warm/dry, cool/wet and grasslands to aid in assessing risk due to fire. This was completed for each watershed within the analysis area.

• It should be demonstrated that increased sediment and water yield resulting from vegetation treatments are acceptable trade-offs in reducing risk of future fire/flood events. **(letter #17)**

The effects due to increased sediment and water yield are disclosed in Chapter IV. Mitigation measures which are sufficient to avoid adverse effects are also proposed. The trade-offs of choosing alternatives which increase sediment and water yield are displayed in Chapter IV. Analysis that projects how risk will be reduced due to the amount of acres treated is included in the Project File (see comments under Water Quality and Effects Analysis).

• The document broadly implies that the lack of burning and logging will cause significant watershed problems in the long term due to catastrophic events. **(letter #17)**

Chapter III of the DEIS, pages 5-11, discusses how each of these drainages would respond to peak flow increases due to fire. As stated on page III-11 streams in ELU 2 are resistant to erosion from peak flow increases due to the inherent geomorphology of the streams. Likewise those streams in ELU 4 and in particular the shale portion of this ELU are susceptible to peak flow increases (III-8). A more complete response to catastrophic risk is included in Chapter IV of the FEIS.

6. Comments Relative to the Physical Integrity of Specific Creeks.

• A respondent requested that the reasons for poor conditions in Vermont Creek be described, and asked what is being done to assure that activities are being mitigated. **(letter #38)**

Reasons for the poor condition in Vermont Creek are stated on page III-9 of the DEIS. Mitigation measures which will assure that alternatives will not further degrade conditions are included with each alternative in Chapter IV.

• A respondent desired further explanation of how the chemical, physical, and biological integrity of Vermont Creek will be protected. **(letter #38)**

As noted on page IV-14 of the DEIS, the physical integrity of Vermont Creek will not be maintained in several of the alternatives and as a result the beneficial uses will not be protected. Mitigation measures that are sufficient to avoid expected results are displayed for those alternatives on page IV-14 of the DEIS.

- A question was asked as to why Elk Creek appeared in Table III-14 but not III-3. **(letter #38)**

  Located in Table III-3 of the DEIS, Elk Creek is included in the Slough Creek Watershed.

- Pickfoot Creek has never been altered and approximately 95 percent of the riparian area is in excellent condition. **(letter # 29)**

  The existing condition is based on riparian disturbance surveys conducted in 1993.

7. Comment Relative to Monitoring Plan

- A concern was expressed that a monitoring plan should be an integral part of the management decision and that a complete monitoring plan should be identified in the NEPA document. **(letter #38)**

  We agree. We have addressed this in much more detail in the FEIS as a feature common to all action alternatives. The Record of Decision also specifically addresses monitoring requirements as a part of the decision to be implemented.

C. NONFOREST VEGETATION

1. Comments Relative to Riparian Issues.

- It was asked if any alternative would directly help or encourage restoration of the waterways that have been impacted by livestock and placer mining activities. **(letter #35)**

  None of the alternatives in this analysis are specifically designed to directly improve or encourage restoration of the waterways that have been impacted by livestock grazing and placer mining activities. From a cumulative effects standpoint, impacts associated with livestock grazing are being considered and evaluated in an ongoing project that proposes to revise the allotment management plans in the Implementation Area. One alternative in the allotment planning project includes revised riparian standards and guidelines for livestock grazing and specific riparian projects that will enhance and restore several severely impacted riparian areas. This includes areas impacted by livestock, mining, and roads.

- One respondent felt that the DEIS lacked discussion about wetlands. Further, he felt there was insufficient information to determine potential impacts to wetlands, isolated wetlands as well as riparian wetlands. **(letter #38)**

  The DEIS is lacking in the description of wetlands and the effects to them. As outlined in the BMPs (Appendix B) wetlands are protected through various practices (11.05, 11.09, 14.03, 14.06). Specific units have been mentioned in the BMPs and will be designated on the Sale Area Map and protected per C6.61. As part of the Helena National Forest's valley bottom inventory, classification and mapping, wetlands within the Implementation Area have been mapped and described. This will be added to the FEIS. There is, however, reference to them in the wildlife description (IV-42) as being in the earlier successional stages and needing representation of other seral stages. It is valid to say that any of these areas that are easily accessible to livestock and other large ungulates have been heavily impacted. There are more interior wetlands that have higher seral stages and are not accessible to livestock. With

the harvest openings, this situation could change and they would become accessible. Mitigation would be done to protect these areas and restrict livestock use (IV-22). This is consistent with the language found in the DEIS, page IV-66, concerning the 'Effect on Floodplains and Wetlands'.

2. Comments Relating to Noxious Weeds.

• Several respondents commented on the need for better discussion of the control, prevention and containment of noxious weeds (exotic plants) during any vegetation disturbances. **(letters # 26, 40, 39, 23)**

Noxious weeds within the Implementation Area have been extensively mapped by species and level of infestation. A discussion of the current control and containment strategy to date is found in the DEIS (III-16). Efforts to contain, control and prevent expansion of weed species is a high priority for not only this project, but across the Helena National Forest.

Establishment of native competing vegetation on disturbed sites is a key component in preventing the establishment of noxious weed species. Subsequent monitoring and control through mechanical, chemical or biological agents is another key component in treating and controlling noxious weeds in the Implementation Area. Overlays of the current infestations and potential disturbance areas from treatment indicated that there is a low risk of noxious weed spread for all alternatives since current infestation areas are avoided. In terms of the burning treatment, the risk of increased infestations is present whether an area is burned or not. By burning under prescriptions that improve competing vegetative conditions, noxious weed spread could be reduced or confined to existing levels of infestation.

Noxious weed mitigation is addressed on II-7, of the DEIS and will be applied in all activities that would disturb soil conditions and alter the competing vegetation balance. Some mitigation will be put directly into timber sale contracts. Roads being closed will be monitored for noxious weeds and treatment will be done annually to control and eliminate new infestations.

3. Comments Relating to Grassland Ecology.

• It was asked what the problem and benefits of burning grasslands are and what about the change in species, the adverse effects and how this will correct existing problems. **(letter #39)**

Grasslands within the Implementation Areas are described on III-15 of the DEIS. Areas proposed for treatment are either stagnant, wolfy stands of rough fescue or are being colonized by coniferous species. Within the higher seral stage grasslands, those in stagnant conditions, there is less plant species diversity and the risk to high mortality from wildlife is higher than under controlled prescribed burning conditions. For those treatment areas that are colonized by coniferous species, there is an existing condition whereby dominant habitat type species are being reduced and replaced by coniferous understory species. Site potential could change in the long term if the area is not disturbed by the historical process that used to maintain these areas as parklands or open grasslands. The effects, both beneficial and adverse are discussed in detail on IV-17-18 of the DEIS.

D. FOREST VEGETATION

1. Comments Relative to Old Growth

• A respondent stated, "Don't log old growth, save the old growth wherever it occurs." **(letter #15)**

A description of the old growth resource may be found in the DEIS on III- 29-32. A discussion of the effects of the various alternatives to old growth may be found in IV-28/31.

• It was asked what the effects of harvest are to the warm/dry forests in ELU 4 including what is the existing stand and target stand structure in terms of basal area, canopy closure and DBH size ranges? How will these structures compare to the Region 1 Old Growth Guidelines? How will logging enhance this type of old growth? What scientific references support this management approach? **(letter #39)**

The treatment of old growth on warm/dry habitat types (groups 1 and 2) can reduce the potential for crown fires by removing smaller trees (which form ladder fuels) from the forest. This also reduces competition for nutrients and water between trees which increases the health of remaining trees. The reduction of ladder fuels also reduces western spruce budworm populations by creating less favorable habitat for that insect. All these factors benefit forest health and make this forest type more sustainable. This is discussed in the DEIS in IV-22-26. A typical structure of this forest type (based on stand exam information for stand 140-03-039 paints a general description of this forest:

Table V-1

Basal Area:	140 sq. ft.	
Canopy Closure:	105 *	
DBH size class:	0-9"	994 trees/acre
	9-14"	123 trees/acre
	14"+	9 trees/acre
TOTAL		1126 trees/acre

**due to multiple canopy layers*

The Big Belts Landscape Analysis targeted warm/dry forests in this ELU to be 85 to 95 percent old growth. Therefore the target stand for this forest type is based on the Regional guides for old growth, which in this habitat type group would be:

Table V-2

Basal Area:	20-60 sq. ft.	
Canopy Closure:	10-30%	
DBH size class:	0-9"	40-80 trees/acre
	9-14"	10-25 trees/acre
	14"+	10-30 trees/acre
TOTAL		60-135 trees/acre**

***based on an unevenaged Q distribution of 1.1*

Specific references which support the stand structures which developed with frequent, low intensity fires are numerous, among them Arno (1985), Fisher and Clayton (1983), Fisher and Bradley (1987), Losensky (1992).

• What is the Natural Range of Variation for old growth for the forests in the area (table)? How is old growth being managed to be effective old growth habitat and what are the recommended densities and patch sizes as per current literature? **(letter #39)**

The Natural Range of Variation (NRV) for old growth depends on the forest ecosystem affected. The Big Belts Landscape Analysis determined the NRV for old growth to be as follows:

Table V-3

ELU	NRV %	EXISTING CONDITION *	DESIRED CONDITION % (in habitat type group)
ELU 2	5 - 10	7.7%	5 - 15
ELU 4 (warm/dry)	85 - 95	10.2%	85 - 95
ELU 4 (cool/moist)	5 -15	5.9%	5 -15

** in habitat type group in the Implementation Area*

Old growth in the cool/moist forests of ELU 4 and the forests of ELU 2 are temporal on the landscape due to the process of stand replacing fires. For this reason identifying replacement old growth is problematic in that this resource is transitory on the landscape. In response to this effect, and because long term treatments are designed to affect the entire landscape, replacement old growth is being managed within treatment areas. This is discussed on page IV-29, of the DEIS. The premise is that by retaining 25 percent of treatment areas as an untreated reserve these areas will age into an old growth component within treatment areas.

Old growth in the warm/dry forests of ELU 4 is more or less permanent on the landscape and 794 acres of potential old growth was identified for this ecosystem (DEIS III-31/32). When this potential old growth is incorporated with existing old growth this forest type is 28 percent old growth. Some of this forest type becomes quite dry and is in the limber pine old growth type. These areas have not been surveyed, but it is suspected that these forests constitute additional areas of old growth.

The best way to insure that old growth is being managed to be effective is to insure that it is sustainable. The warm/dry forests of ELU 4 may be managed for improved sustainability by removing ladder fuels as has been discussed. This old growth provides a savannah in the warmer and drier ecosystems. This is discussed in the DEIS on IV-28-31. Cooler and moister forests are more prone to provide old growth with an interior forest condition Managing these forests with a buffer of non-old growth forest around the actual old growth stand will facilitate old growth interior conditions.

There is little information as to what effective patch sizes and densities of old growth should be. Each forest ecosystem is a unique combination of a variety of environmental factors and influences. In the warm/dry forests of ELU 4 old growth is directly affected by the size of the landform. In the cool/moist forest types of ELU 2 and 4 old growth tends to be a remnant which has survived past disturbance. This may be due to landform, or the randomness of past fire(s).

The most specific information for a particular forest or mountain range has been developed in the landscape analysis for that area. As the landscape analyses on the Forest indicate, managing old growth within the densities that are within the range of natural variation seems to best insure the sustainability of this resource and the species which inhabit it. The patch sizes of the existing old growth is displayed on Table III-11 in the DEIS. For a discussion of how species interact with patch size and distribution, reference the discussion of wildlife and fragmentation.

• Which stands will be incorporated into an old growth management plan, both for existing old growth and replacement old growth? What are the elevations for designated old growth stands? What is the basis for requiring five percent of each third order drainage to be managed for old growth? Please demonstrate that the five percent old growth level is representative of average historical conditions. How is Forest Plan direction for emphasis of old growth below 6,000 feet being implemented? Why is the Forest ignoring forest plan direction for five percent old growth retention in each third order drainage? **(letter #39)**

The Forest Plan on page II-20 states that "Five percent of each third order drainage should be managed for old growth. The priority for old growth within each drainage is: first, land below 6000 feet in elevation; second, riparian zones and mesic drainage heads; and, third, management areas emphasizing wildlife habitat." This guidance was the best available when the Forest Plan was developed. With the continuing development of ecosystem management and the concepts of landscape ecology, better information of what should be expected and what is sustainable for a particular forest type has become available. The DEIS III-29-31 displays the amount of old growth in the area based on the Forest Plan standard as well as within the context of the ecosystems in the Implementation Area. Five percent old growth is at the lower limits of the range of natural variation for the cool/moist forests of ELU 4 and the forests of ELU 2. The warm dry forests of ELU 4 are below their natural range of variation. This may be due to a past disturbance which affected stand structure and age such as fire, or in some cases, these forests have been harvested.

Stands, and their elevation which have been identified as old growth in the Implementation Area are included in the Project File.

• What are the cumulative effects of harvest on private lands to the old growth resource? **(letter #'s 15, 39, 40)**

The effects of harvest on private land to the old growth resource are probably negative. For this reason private lands were not considered in the old growth analysis, only National Forest lands were analyzed. This allows a representation of the minimum amount of old growth in the ecosystem, versus what actually may be present. It also represents what the Forest Service actually has the ability to manage.

2. Comments Relative to Forest Health.

Comments were received about forest health. These comments ranged from expressing concern about the amount of insects and disease activity in the area, to comments that there was little evidence to support concerns for forest health. The term forest health has been used throughout the EIS to refer not only to pathogens, but also to sustainability of existing forest structure.

• Some comments described forests as containing a large amount of mortality and being so overmature they they were a liability to forest health. It was stated that areas with high amounts of mortality should be considered for treatment. It was recommended that a large area of forest and non-forest vegetation should be treated, to move towards the more sustainable ecosystems. **(letter #'s 12, 22, 31)**

Forest Health is described on III-23-25 of the DEIS, in a description of the existing landscape and in a discussion of insect and disease populations in the area.

From Green's Gulch to the head of Beaver Creek only north facing slopes are forested. In this area there is significant mortality, due to winterkill.

Where warm/dry aspects are forested with Douglas fir there is generally significant damage by western spruce budworm. These sites have developed ladder fuels and are under stress due to competition for water and nutrients. Both these factors favor continued and increasing populations of the budworm.

Lodgepole pine has generally attained the age and size where it is favorable habitat for mountain pine beetle. Based on these factors, plus considering the latitude and elevation of the area, lodgepole pine is high risk to attack from this insect. Mountain pine beetle is not presently active in these forests.

Dwarf mistletoe is a parasitic plant infecting some stands of lodgepole pine. This parasite does not kill trees outright, but does weaken them and make them more susceptible to other sources of mortality.

Insects and diseases do contribute to biological diversity through the niches they create in the landscape. Certainly, eradication of these species is neither possible nor desirable. The above discussion refers to the insect and disease situation from a tree health perspective.

Of greater concern is whether forest age, composition and structure are sustainable on a landscape scale. This is discussed in the EIS in numerous places including; III-17/24 and IV-22/30. The desired condition for forest structure centers on sustainability. In the warm/dry forest of ELU 4 this involves restoring stand structures which developed from the frequent fire processes. In the cooler/moist forests of ELU 4 and in ELU 2 infrequent fires often burned extensive area with stand replacing intensities. When the Integrated Desired Condition was developed in the Big Belts Landscape Analysis it was felt that extensive fire (or other disturbance processes) were damaging to other associated forest resources. Age and structural diversity can provide buffers in disturbance process in that not all vegetation is susceptible to the same processes simultaneously. Therefore the decision was made to manage these forests with disturbances which were at the lower Range of Natural Variation. Basically, the entire DEIS and FEIS addresses "forest" health and ecosystem sustainability.

- A concern was raised that the proposed schedule for reentry in the area would require managing existing forests until approximately the year 2125 before all areas would be treated. Whether this is sustainable is questioned. **(letter #6)**

The present forest age and composition is described on III-17-18 of the DEIS. In ELU 2, 90 percent of the inventoried stands are greater than 100 years old. In ELU 4, 84 percent of the inventoried stands are greater than 100 years old.

Of the 19,674 forested acres in the Implementation Area, 4,845 are within congressionally recommended Wilderness and were not considered for treatment. An additional 1,061 acres of forest would be retained to meet the Forest Plan standard, that a minimum of five percent of each third order drainage be retained as old growth. Therefore the actual forest base available for treatment is 13,767 acres.

The alternatives treat the following amounts of those 13,767 acres.

Table V-4

Treatment	Alt A	Alt B	Alt C	Alt D	Alt E	Alt F
Forest Harvest	2,245	0	1,911	3,272	2,867	3,226
Forest Underburning	1,034	0	928	80	409	439
Total	3,279	0	2,839	3,352	3,276	3,665
% Area Treated	24%	0	21%	24%	24%	27%

The Alternatives treat approximately 1/4 to 1/5 of the forested area. At this rate of treatment, it will take between 75 to 100 years to treat the available forest base. When (and if) the recommended acreage becomes designated wilderness, a prescribed fire management plan should be prepared for that area.

This scale of treatment would move forest age class structure to the desired condition identified in the Big Belts Landscape analysis for ELU 2, but not for ELU 4. However when the next treatment is applied, both ELU's would be within their desired condition for the land available for treatment with these management tools. When the last of the forests (currently older than 100 years) is treated it will be near its biological rotation and the risk of mortality from other sources will be high. Given the current age class structure of the area this is unavoidable when other resource concerns are considered.

- Other comments asked to demonstrate that a forest health problem exists in the area, and what conditions threaten area forests and wildlife. Evidence of a forest health problem was requested. **(letters #39, 40)**

Forest Health is described on III-23-25 of the DEIS. Forest health is the predominant rationale for the entire project as is discussed in the Purpose and Need for the project, DEIS I-3-4.

- A question was asked as to the effects of eliminating fire for the long term in the Implementation Area. **(letter #39)**

The effects of eliminating fire from the forest ecosystems in the area is somewhat theoretical in that, in general, this is not within the capabilities of human influence. This is discussed in the DEIS on pages IV-6, 12, 16, 22, and 30.

Initially with this management scenario physical resources would remain unchanged, while vegetation would continue to advance successionally, and forests within the area would continue to advance toward climax conditions.

With fire control, lodgepole pine will continue to age, and an understory of subalpine fir or Douglas-fir, whichever is climax on the site, will develop. In all probability, the majority of the lodgepole will succumb to rots, insects (mountain pine beetle) and disease within the next 50 to 75 years. As these trees die, they will fall and create widespread and heavy fuel loading in the area. Eventually, even with man's intervention, a wildfire will start in the area. Due to extreme fuel loads, the fire will burn through the area with very high intensities.

In the short term fire's elimination would not affect species diversity. As natural forest succession continues, a larger percentage of forest vegetation would progress toward climax forest conditions. Ecological stability would decrease as stands become more homogeneous and susceptible to the same insect or disease conditions.

In nature the elimination or reduction of one source of mortality, such as fire, will often provide opportunities for other sources of mortality.

The removal of fire from the system would place the lodgepole pine in the area at continued and increasing risk to attack by mountain pine beetle. In lodgepole stands infected with dwarf mistletoe growth reduction, stem deformation and mortality would continue and increase.

Within the warm and dry Douglas fir forests western spruce budworm epidemics would continue to kill trees. Old growth character Douglas fir trees would be lost and the old growth nature of the forest would decrease. The loss of the old growth Douglas fir would take centuries to restore. Ladder fuels would continue to increase in these stands and the risk of a canopy fire in this forest type would continue and increase.

In sum, the elimination of fire from these forest ecosystems is not possible, but in theory removal of this process would result in forest advancing in successional stage, becoming more homogeneous and as a result susceptible to other pathogens on a widespread scale. Ecosystems are generally less adapted to these less common sources of mortality, and a greater disruption of stand structure and composition may be anticipated.

3. Comments Relative to Silvicultural Systems.

• Several comments were received about silvicultural systems employed. These included; how would the shelterwood, seedtree and clearcut prescriptions differ from past Forest Service management, and how they fit into Ecosystem Management? Concerns were expressed over the size of the harvest (and presumably) burn areas. **(letters #23, 39)**

Silvicultural prescriptions are defined in the DEIS in Appendix C. Standard silvicultural definitions were utilized to convey to the reader the intent of the prescription. For example, evenaged prescriptions such as clearcut, seedtree and shelterwood are designed to regenerate the stand. This silvicultural terminology also allows some understanding of the number of trees to be retained in a treatment area. Departure occurs from traditional prescriptions in that the trees left will generally be of irregular distribution, that is they will not be evenly spaced in the treatment area. Also, the concept of leaving 25 percent of a treatment area as an untreated reserve departs from standard silvicultural practices. Both the irregular individual tree reserves and the untreated stand reserves will allow considerable structural diversity within treated areas. These reserves will age into an old growth component during the time it takes the newly regenerated stand to mature. An additional departure from more recent silvicultural practices is that the treatment areas are large. This allows the treatment of landscapes which moves large areas through similar seral stages simultaneously. The alternative to these large treatments is a series of smaller treatment areas which has a high potential to fragment the landscape.

• Comments questioned whether clearcuts (and presumably other harvest systems) replicated natural processes such as fire. **(letter #39)**

It is an over simplification to state that clearcuts replicate natural fire. The only thing which replicates natural fire is natural fire. Harvest systems can be viewed as a disturbance process to the existing forest which initiates its regeneration. Stand structures can be retained which would be similar to those occurring with a particular intensity of fire. Differences are certainly apparent between these two processes. Fire is somewhat random in its intensities and, while results are general in nature, they are not predictable on a specific site due to variations in fuel loading, slope and general burning conditions. Harvest is much more predictable in its results. A significant difference between harvest and fire is that with harvest a valuable natural resource is removed for the benefit of society. This is not true with fire. This is discussed in the DEIS on IV-22/25.

• Comments were received as to whether dead trees in burned areas would be salvaged, and what those effects would be. It was also asked how the Agency would insure that seedtree and shelterwood trees would be left as reserves and how their retention would be insured. **(letter #39)**

Comments were received as to potential salvage of dead trees in stand treated with forest underburning. It is the intention of the prescription that no salvage of these burn trees would occur. This is discussed in the DEIS in IV-23.

In order to retain seedtree and shelterwood reserves, as well as untreated reserves, stand harvest prescriptions in the Timber Stand Management Record System will be entered which show that the stands are being managed with reserves. Detailed silvicultural prescriptions will be kept in the stand folders which will further emphasize the management of stand reserves.

• It was asked how two snags per acre would be maintained in the area over time. **(letter #39)**

The snag resource is discussed on III-19-21 of the DEIS. Existing and replacement snags will be retained in either harvest or underburning prescriptions as per Forest Plan standards. In addition, individual tree and stand reserves will allow for future snag recruitment.

• It was questioned how there could only be one stand condition considered normal. **(letter #39)**

Forest ecosystems and processes are discussed on III-19-22. There is not "one" stand condition which is considered "normal", but there is a range of natural variation within these ecosystems which represents a balance between forest vegetation and ecosystem processes. This is discussed in the DEIS, FEIS and the Big Belts Landscape Analysis.

• Comments were also received which recommended low impact harvest systems such as horse logging and harvest utilizing conventional systems. **(letters # 5, 12)**

Yarding systems considered are conventional with the exception of helicopter yarding in Alternatives C and F. Horse yarding is a possibility as long as slopes are gentle.

• A question was asked as to how the proposed management regime would increase timber harvest on the Forest due to the inclusion of unsuitable ground into vegetative treatments. **(letter #39)**

This is beyond the scope of this project.

• There was a comment as to why the age class structure of the forest is predominantly between 100 to 125 years old, and did early settlement of the area affect age class structure and patch sizes? **(letter #40)**

The age class of the forest is "clumped" in the 100 to 125 year old age class. Most probably this is a reflection of the time since the last major disturbance affected the area. Early settlers did affect some areas of the Big Belt Mountains with their activities, but this is probably not the case in this area. Due to the remoteness of the area it is doubtful there was much early harvest, and few old stumps have been observed in reconnaissance of the area.

• There was a comment that a lack of insect epidemics in the lodgepole pine has been controlled by logging and that this is eliminating habitat for species which need decadent stand conditions. **(letter #40)**

Timber management has occurred on 1,346 acres of the 18,284 forested acres in the Implementation Area as is discussed on III-25 of the DEIS. This is seven percent of the forested base. There are significant areas of decadent forest for species dependent of such habitat. There have not been significant insect or disease epidemics in the lodgepole pine in the area, either with, or without timber harvest.

• It was asked how many acres, proposed for harvest, had less than a 90 percent success rate for reforestation? **(letter #40)**

This will be contained in the FEIS as this comment requested.

• Comments were received asking what the effects of treating unsuitable forest lands at high elevation and on unstable slopes and how reforestation of unsuitable lands will be accomplished? **(letter #39)**

No forest vegetation treatments are planned at extreme elevations or on unstable slopes. Treatment units on unsuitable lands would experience some incidental detrimental soil disturbance depending on the logging system used, the kind and amount of site preparation needed and whether the operations

were conducted during winter conditions or not. These effects are discussed on Chapter IV-2-11 of the DEIS.

We do not anticipate slope instability problems on any of the forested vegetation units proposed for treatment. This assumption is based on field observations, photo interpretation and soil inventory information. There are no anticipated regeneration difficulties to attain desired stocking levels in treatment areas.

• There were several comments about patch size including; what are the historic patch sizes, how were they determined, how has Forest Service management affected patch size, what will the average patch size be? **(letter #'s 39, 40)**

Historic patch size was analyzed in the Big Belts Landscape Analysis. To a great extent, patch size is determine both by the ecosystem process disturbing vegetation, but also by the physical relief of the land. The landscape analysis concluded the following:

Table V-5

ELU	HISTORIC PATCH SIZE	INTEGRATED DESIRED CONDITION
ELU 2	5,000 acres	250 to 2,500 acres
ELU 4	2/3 > 500 acres	20 to 1,500 acres 1/3 < 500 acres

Patch size was determined by querying the Timber Stand Data Base for the age of the greatest basal area of the stand. This information was then mapped and, in conjunction with photo interpretation, patches of similar aged forest were mapped. A comparison of stand ages allowed the conclusions as to historic Range of Natural Variation for patch size. Past Forest Service management has affected patch size a number of ways. In the 1960's and 70's harvested areas were quite large and are within the range of desired patch sizes. In the 1970's and 80's patch sizes were reduced 1nd in many cases caused fragmentation of forested stands by reducing patch size below the range of natural variation in some instances. With the new information which is being developed by landscape analysis it is becoming apparent that larger patches are generally more desirable than several smaller ones. The average patch size of treated areas in for the EIS is found in Appendix C-31 of the DEIS.

E. HARVEST TECHNIQUES

1. Project Design and Silvicultural Prescriptions

• Comments were received questioning how the project was designed. They asked for clarification of why certain silvicultural systems were utilized in one alternative but not in another. It also asked why some treatment areas were present in one alternative but not another. Several examples of apparent discrepancies were given. It was also asked that if the Proposed Action treated areas with the greatest departure from the desired condition, why was it necessary to treat additional areas in other alternatives. Also questioned was that if the Proposed Action was to treat areas with the greatest departure from desired conditions, why did other alternatives regenerate more areas of dead forest and areas affected by insect and disease populations. **(letter #'s 38, 39)**

These concerns may be addressed with a review of how the Proposed Action and other action alternatives were developed.

The development of the Proposed Action was based on management direction and standards and guides of the Forest Plan. The Proposed Action also incorporated the ecological conclusions stated in the Big Belt Landscape Analysis.

Projects were designed at such a scale as to allow for treatment of vegetation every 25 years within an Implementation Area. This relatively infrequent entry period would allow recovery of associated resources between vegetative treatments It is the intention of this treatment schedule to develop a diversity of size and age classes on the landscape which would be more resistant to extensive fires or outbreaks of pathogens.

The Landscape Analysis concludes that warm/dry forest types have developed stand structures considerably different than those of the pre-fire suppression era. Insects and diseases are increasing in these forests, and the risks of crown fires is intensifying due to the development of ladder fuels. Management direction prioritized treatment of these areas to restore this landscape within two entries and directed 1/2 the acreage of these forest types be treated in this entry. The effects of these treatments would be to restore stand structure to within the range of natural variation which would greatly improve the sustainability of this ecosystem.

The Landscape Analysis concludes that cooler and more moist forests have a general lifespan of about 150 years between stand replacing fires. The Landscape Analysis also reached an Integrated Desired Condition which concludes that to prevent large scale disruption to associated resources it is preferable to have a diversity of stand ages and structures which would allow a greater probability that large scale fire would not stand replace all forested areas within the fire perimeter. Therefore treatment of these forest types with a 150 rotation; coupled with the 25 year entry cycle directed 17 percent of these forests were considered for treatment in this entry.

The Proposed Action was developed with these parameters. The Timber Stand Data Base was queried to differentiate the major forest types and an appropriate per cent of each type was targeted for treatment. Silvicultural prescriptions were prepared with information available from stand exams and the Timber Stand Data Base. Other alternatives treat more acres of dead and diseased forest because they were based in more extensive information and reconnaissance.

After scoping, issues were developed and alternatives designed to respond to them. A forest management modeling computer/GIS tool, SNAP, was utilized to design alternatives responsive to most of the issues. Alternatives were developed with SNAP which maximized Present Net Value, Alternative D; which did not enter roadless areas, Alternative E; and which built no new roads, Alternative F.

Because of the varying constraints of these alternatives different treatment areas were considered with the alternatives. For example, Alternative E does not enter roadless areas so more treatments occur in roaded areas to attain the desired acreage of treatment. Alternative F, which is constrained not to build roads, disperses harvest along existing roads. These differences also change the size of some treatment areas.

Other issues in the analysis included forest health and big game security. Alternative G was developed to respond to concerns for forest health, past fragmentation caused by timber harvest and forest mortality caused by winterkill. Alternative C responds to big game security. The team decided that forest health and big game security were synonymous in the context of ecosystem management and the two alternatives were merged into Alternative C. Once more, because of its focus, some different areas were treated.

The alternatives do have different silvicultural prescriptions for the same treatment areas. This allows a comparison of the effects of different treatments, and in doing so responds to different combinations of issues. For example, treatment area A5 is a forest underburn in Alternative A, but in Alternative F it is treated with a selection harvest. This allows a comparison of effects, and also causes Alternative F to be more responsive to economics. The prescriptions generally used in Alternative F generally are more economically oriented than they are in Alternative A, in an attempt to harvest more volume. The tremendous costs of helicopter yarding, however, cause Alternative F to be below cost.

F. FISHERIES

1. Comments Relative to Fisheries Existing Conditions

• In very general terms, we expect the use of ecosystem management principles in the Implementation Area to maintain or enhance watershed values that provide the foundation for Montana's fishery resources both above and below National Forest boundaries. **(letter #17)**

Ecosystem management is embodied in the range of alternatives considered in the DEIS with specific aims to include restoration and sustainability of soils, water, and ecological processes. Implementation of projects to attain desired conditions is scheduled on a watershed basis with reference made to the Big Belts Landscape Analysis relative to specific watershed and fisheries conditions (Page I-4). Although not emphasized in the DEIS summary, watershed conditions and associated salmonid habitats are more fully addressed in a cumulative sense through road treatments that emphasize net decreases in roads (page II-33 and Appendix A of the DEIS) and strict application of Best Management Practices to ensure individual vegetative treatments do not cause cumulative effects in the larger watershed area (DEIS, Appendix B).

• Map III-6 intended to show the distribution of fisheries in the Implementation Area is of such poor quality, that it is difficult to obtain the desired information from this map. **(letter #38)**

The quality of map reproduction for the DEIS was discussed and generally agreed to be of poorer quality than hoped for this document. The Project File, however, contains original maps of higher quality available for review. For the purposes of this DEIS, it was agreed that specific narratives addressing fisheries in Appendix E provided the necessary information to address fisheries distribution within Implementation Area streams.

• Modeling results from fisheries investigations should be included in tabular form in the appendix or text of the DEIS. **(letter #35)**

The tables displaying fisheries modeling results have been omitted in the editing process in the interest of keeping the document compact as possible. This was discussed and generally accepted as technical information more relevant to specific fisheries review rather than standard fisheries information routinely disclosed in a DEIS or FEIS document. This technical data regarding specific fisheries modeling results located in the Project File and is available to those interested upon request.

• It is stated (page III-37) that resident trout populations have been documented in five streams in the area. Table III-14, fisheries summary, however, only provides fisheries information for four streams. **(letter #38)**

We acknowledge the omission of fisheries information for a fifth stream in Table III-14 of the DEIS during the editing process. The FEIS shall display that information in an amended table under the appropriate fisheries section to include all streams with fish .

• In the fisheries section, what is the potential that the RbxWctxYct population (8/1000) would be pushed to extinction by any of the alternatives if spawning habitat is reduced 9-12 percent and recovery to current conditions does not occur for six years from the conclusion of management activities? **(letter #35)**

Only alternatives A and D would result in increases of sediment in spawning gravels of 9 and 12 percent respectively. Such increases do not imply "spawning habitat is reduced 9-12 percent", but rather a general increase in sediment is expected in spawning substrates as projected by the FishSed Model. Our best models, as any other model, should not have their outputs confused with the real system . They are utilized as a tool on which to base professional interpretation and judgment conveyed to land managers.

The question concerning the potential that the hybrid cutthroat in Atlanta Creek may be pushed to extinction under the foregoing scenarios implies a viability assessment with quantitative rigor. Currently, there are no formal established criteria for classifying extinction risk, and the Forest is in the process of developing and incorporating a viability analysis program--Bayesian viability assessment module--that blends quantitative rigor with qualitative assessments which evaluate a suite of demographic and habitat variables. Our effects assessment is directed at one of those variables--incubation survival. Lacking comprehensive survey information on population characteristics and processes, we can only base best professional judgment about extinction risk through the qualitative analysis in Rieman et al. (1993). Excluding the presence of a diversion structure at the Forest Service boundary, we judge the population in Atlanta Creek at moderate risk of extinction before and after commencement of management activities. If we include the diversion structure into the equation as an isolating factor, this population faces a high risk of extinction with or without management activities, i.e., the probability of persisting through the period 100 to 200 years relevant to forest management is less than 50 percent.

G. WILDLIFE

1. Comments Relative to Habitat Fragmentation, Patch Size, and Biological Corridors.

• Several respondents repeatedly cited the failure of the DEIS to address the impacts and levels of fragmentation as a consequence of vegetation treatment, while two other respondents indicated a failure to address biological corridors in the DEIS. **(letters # 36, 39, 40)**

Fragmentation was addressed with the assumption that treatment is designed to mimic natural process (Chapter IV pp. 23, 27, and 28 of the DEIS). The Big Belts Integrated Analysis showed us that fire is the major driving process within the area. This information indicated that fragmentation within the forested habitats is part of the natural process within an area that is inherently fragmented by inclusions of native grasslands. Within that framework there are going to be impacts to specialist species and benefits to generalist species to varying degrees. The departure from that inherent framework is the fact that our silviculture expertise cannot completely emulate natural processes and that our treatment areas are of smaller size than what occured historically within integrated desired future conditions. The important premise to keep in mind is these treatments are modeled after those conditions under which the native wildlife species evolved, the differences being the level of nutrient which is being cycled, wildlife species composition, and the inter/intraspecies dynamics. Fragmentation could be better addressed within the DEIS and will be, by species or group of species, in the FEIS. In addition, a section has been added in chapter IV to address cumulative effects regarding fragmentation, biological corridors, and patch size.

• There was no analysis on wildlife impacts from the total road corridor density that will be required for implementation of this management regime. **(letter #39)**

There is an extensive analysis related to effects upon wildlife in the section describing elk and wolves. The analysis for elk was in the DEIS the discussion for wolves was not. The target for road densities are identified within the Forest Plan and though we do not meet those numbers for all of the alternatives, we are moving in that direction considerably in most.

Habitat fragmentation resulting from new roads is mitigated by the fact that all new roads will be reclaimed following completion of use. The only fragmenting effect would then be the width and length of the road which would last as long as it would take for it to revegetate. With the road packages included in some of the alternatives the road fragmentation would decrease from present levels.

• Please evaluate the impact of historical, present, and planned road corridor densities in the Implementation Area on wildlife as they affect patch size and patch quality. **(letter #39)**

Patch size and patch quality are terms relative to each individual species. For elk, 250 acres 1/2 mile from a road is the recommended size (Hillis et.al. 1991). For the goshawk 30, 420, and 5,400 acres are recommended sizes (Reynolds et.al. 1992). Other species have other recommendations. The point is, patch size was analyzed to the capability of the landscape to display (via vegetation) within the historic range of variation. We recognize the role roads have played in the effectiveness of these patches. The Big Belts Integrated Analysis served to validate that we have a problem. The roads package in Alternative C was developed to specifically address this problem. An analysis of this nature will be undertaken for the Big Belts persuant to a Travel Management Plan in 1996 to develop corrective measures outside of the Implementation Area. We feel that the road corridor analysis for this project was marginally adequate in the DEIS and is now sufficient within the FEIS.

2. Comments Relative to Elk.

• Several respondents felt the DEIS analysis of elk vulnerability/security were not clearly explained, noting the lack of specified definitions, maps, and percentages which seem misleading. There was also a concern as to the coordination with Montana Fish, Wildlife, and Parks. **(letters #39, 27)**

The sections on elk security are confusing and could have been written better. To that end, those sections are re-written for the FEIS and will address all of the concerns as specified in the responses. Elk vulnerability will be tied in as a function of elk security.

Elk security was analyzed the same for the complete area of the Thomas-Benton Herd Unit which includes the Implementation Area. This analysis did not take into account management area designation. The Hillis Paradigm does not discriminate as to where elk security is located. Area closures and road obliteration were incorporated into at least one alternative, if not a combination of alternatives, to address areas of concern. These features were not developed by management area as much problem areas. Maps of elk security areas within the Implementation Area, by alternative, were included in the FEIS.

Much of the confusion within the section regarding elk was identified by Montana Department of Fish, Wildlife, and Parks Biologist Dick Bucsis. His concerns and suggestions were clarified and incorporated through coordination prior to these responses.

• The historic conditions for elk security were never provided or compared to existing or planned condition. **(letter #39)**

The historic condition for elk security was not include for the simple reason that problems are occurring today. Most of the impacts/manipulations regarding elk have occurred in recent history and resulted in population numbers higher than probably occurred historically. We may compare historic conditions to current and planned conditions, but it is doubtful that it would yield any meaningful results. Hunter

and elk populations are well above anything which may have occurred historically. Therefore, elk security is something addressed in existing condition and desired future condition.

• What analysis has been done to determine that harvest on big game winter range (T-2) represents habitat improvement and will maintain optimum habitat conditions? **(letter #39)**

Big game were not the sole wildlife consideration in the assessment of wildlife habitat. Areas have been designated for harvest in different areas for a variety of reasons. Stands of conifers within winter range have been selected for thin from below treatments in several alternatives, while in others they have been selected to impede encroachment. In either case, the restoration of historic structure and function may have eclipsed big game needs. The needs of the many outweighed the needs of the few from a species perspective. Sustaining a full range of habitat for a full range of species over the long-term is the object of this project.

3. Comment Relative to Forest Songbirds.

• One respondent repeatedly indicated the lack of analysis regarding the effects upon forest songbirds. **(letter #39)**

In development of the Helena National Forest Plan, the Forest did not, designate a Management Indicator Species representative of forest songbirds. The concern over their viability has particularly grown over the past few years. The respondent was correct in pointing out the lack of analysis within the DEIS. A section has been added to the FEIS to address those concerns.

• The same respondent, as part of a question regarding MIS/SS, asked what the expected viability of forest songbirds would be under the fragmentation regime desired future condition would be? **(letter #39)**

This is a difficult question to answer, as forest songbirds are comprised of a large and diverse group of species and the area is inherently fragmented. The effects section of the FEIS addresses this question in more detail but, for the most part, implementation of this project will have short-term impacts upon the forest interior species in the area to some degree, depending upon the chosen alternative. Whether this will affect viability of some of these species is questionable.

4. Comments Relative to Cumulative Effects.

• A request to address the impacts on wildlife that will result from the concentration of the timber harvest regime at lower elevations during the past and proposed management entry was made. **(letter #39)**

The rotation schedule for harvest is based upon the estimated fire frequencies for the area. The harvest prescriptions in the lower elevations (ELU 4) are, in most alternatives, much more sensitive and emulate patterns and processes that have shaped the landscape. In theory, the patterns and processes should be sufficiently emulated such that the response of wildlife would be similar to that of historic processes. The real concern about harvest levels at lower elevations has to do with the harvest which is occuring on private land. There is a discussion within the forest songbird section which addresses this problem.

• A respondent stated the cumulative effects analysis to the MIS species is inadequate. There were no cumulative effects analyses for individual species. The analyses lacked any discussion of distribution and viability of species. **(letter #40)**

As previously mentioned under reponse to TES, the Big Belts are on the eastern fringe of the ranges of some MIS and most SS. Also as previously stated, under reponse to TES, suitable habitat is assumed to be occupied until evidence proves to the contrary. The repondent is correct in pointing out the lack of cumulative effects analysis in the DEIS. Those sections were added to the FEIS as requested.

Additional information regarding these species will be included in the Determination of Effects for the chosen alternative.

• One respondent suggested cumulative effects to old growth dependent species by activities on both private and public lands requires a substantive review and analysis. **(letter #40)**

The DEIS only concentrated on those areas under Forest Service jurisdiction because that is all we have influence upon. Timber harvest on private lands has accelerated dramatically in the last 10 years and as a result, old growth habitat is, and will continue to be reduced on private land. The Forest Service could not manage to cover that loss and ensure a full compliment of historically available habitats. Under the vegetation treatment regime, 25 percent of each unit will be left to serve as future old growth. It is estimated that within 40 - 70 years those leave areas will begin to function as old growth. Initially, old growth species may see a decline in available habitat, but in 40 - 70 years there will be the remainder of those 25 percent leave strips for habitat. This method ensures long-term sustainability of old growth habitats across the Implementation Area. If we were to strictly manage for old growth, then those species which do not depend upon old stands are libel to be in trouble and we would see the mirror image of this issue in the future.

• It was asked, what will be the short and long-term impact of the proposed management regime on forest interior species? How much interior habitat is necessary to maintain MIS/SS found in the Implementation Area? How will this habitat be provided, where at in the Implementation Area, and how will it be maintained over time? **(letter #39)**

As with the old growth species, there will be a short-term decrease in available habitat for forest interior species which will recover to provide adequate quantity and quality of habitat in the long-term. A discussion to this effect is displayed in the added section on forest songbirds in the FEIS. The size and distribution of this habitat will be dynamic in nature as it would be under the influence of natural processes, only at a smaller scale. This habitat will be maintained over the long-term as the landscape is capable and within the parameters of forest health.

• A respondent stated, no management strategies are in place to ensure habitat protection/maintenance for MIS/SS. **(letter #39)**

The Desired Future Condition is the management strategy to ensure habitat. In the long-term, the full range of habitats that occurred historically will be more fully represented and dispersed across the Implementation Area. As they become available, Regional Conservation Strategies will become incorporated into management activities, but at the moment there are few available. Those that are available, are in draft form awaiting final edit and were not used for this analysis.

• It is appropriate under these circumstances that goshawk viability and distribution be discussed. A sensitive species that is an indicator of of forest interior habitat (and lack of disturbance) will have its' nesting habitat ruined and will be be displaced requires a thorough cumulative effects analysis. **(letter #40)**

The northern goshawk is not currently listed as sensitive within the Northern Region. Furthermore, mitigation measures have been added to the FEIS to ensure that the nest stands of goshawks within the Implementation Area are not entered and that any harvest activities within the post-fledgling area will be restricted from March 1 - September 30. These mitigation measures will ensure minimal disturbance to the birds within this area.

• Please demonstrate how management of MIS is possible without any data on population trends and habitat occupancy within the Implementation Area. **(letter #39)**

As with sensitive species, MIS occupancy is presumed unless information to the contrary is available. Those habitat parameters are then considered in relation to the landscape's capacity to produce them. Therefore, management of MIS is possible through maintenance of available habitat.

5. Comments Relative to Diversity.

● How will diversity be maintained with the exclusion of natural fire? How will species dependent upon coarse woody debris in fire regenerated stands, and burned habitat be maintained at historic levels? If they won't be maintained at historic levels, what is the estimated impact on landscape viability? **(letter #39)**

There are four main tools to move the area toward Desired Future Condition; harvest, grazing, controlled fire, and naturally occurring fire. Naturally occurring wildfire has not been ruled out as a tool. Pending the development of a Fire Management Plan, prescribed natural fire may be used within the Big Belts. Post harvest slash treatments will be done in such a way as to approximate, as closely as possible, conditions following a fire. In the warm/dry ELUs, downed woody debris will be left and burned following harvest. In the cool/moist ELU, slash will be burned in such a way as to create standing snags. There are two differences from historic process within this project; the most obvious is the removal of biomass from the nutrient cycle and the second is the size of area affected. The Big Belts Integrated Analysis indicates that the areas affected are much larger historically. The viability of the landscape should remain fairly intact. The reintroduction of prescribed natural fire at some point in the future should re-enforce vegetative progression to Desired Future Condition provided that they are not too severe.

6. Comments Relative to Surveys.

● Please complete the necessary level of field surveys required to identify key occupied habitats for MIS/SS, so that some understanding of population densities and habitat use in the Implementation Area can be obtained. **(letter #39)**

Surveys of this nature are best addressed by university level studies. Granted we do not have information of this caliber for the Implementation Area, but we do have information from similar areas for which studies have been completed. The results are then extrapolated to the various resident species in our Implementation Area to fill in the information gaps. The area has also been ground-truthed. These have been cited where used.

● The DEIS failed to demonstrate that any Forest Plan monitoring has been completed in the Implementation Area to assist in management of MIS. **(letter #39)**

It is essentially true that specific Forest Plan monitoring has not been completed. Montana Fish, Wildlife, and Parks keeps the information on elk and mule deer up to speed and existing goshawk nests are monitored, but other monitoring has been subject to available funding. Therefore, as previously stated, assessment of MIS habitat relies upon the assumption that all available habitat is occupied.

● No adequate surveys have been completed to identify quality and critical habitat for MIS/SS in the Implementation Area. **(letter #39)**

It is true that we do not have complete surveys for all of the MIS/SS in the Implementation Area. This is why we made the assumption that if there is suitable habitat, of any kind, we assume that it is occupied. Suitable habitat is defined by referenced and experience-based knowledge of the habitat requirements of individual species. More complete and comprehensive surveys are initiated as funding permits. Units within the Implementation Area will receive surveys prior to harvest.

7. Comments In Relation to Roadless Areas and Wildlife.

• What are the historical and current values of roadless lands in maintaining viable populations of native wildlife species, and how will long-term viability of vulnerable species be impacted by the proposed roading of the entire Implementation Area? **(letter #39)**

The historical and current value of roadless lands in the maintenance of viable populations of native wildlife species depends upon the species in question. For example, these areas are critical to the grizzly bear but not so critical to elk as evidenced by ever increasing populations within heavily roaded areas. For the most part, roadless areas have been located within areas of difficult access. If you happen to be one of the species adapted to these habitat conditions, then roadless areas may be crucial to your survival. If you happen to be one of the species with habitat parameters outside of roadless areas, you have either had to adapt or dropped out of the species matrix. Within the Implementation Area, grizzlies are not present, therefore roadless areas do not aid in their viability. However, for species such as the wolverine, roadless areas may be crucial and there will be an impact upon available habitat. Effects such as these will be reflected in the Determination of Effects once an alternative is chosen.

• Your report failed entirely to mention that the Irish Gulch, Cayuse, and Camas Creek roadless areas are key linkages between the Bob Marshall and Yellowstone Wilderness Complexes. Your plan to destroy these roadless areas would effectively eviscerate the roadless connectors between the Gates of the Mountains Wilderness and the Elkhorn Wildlife Management Unit and between the larger Bob Marshall and Yellowstone Ecosystems. **(letter #36)**

The respondent is correct in stating that these issues were not addressed in the DEIS. A section on Fragmentation, Linkages, and Biological Corridors has been added to chapter III and chapter IV to address these issues.

• We would like the analysis of the roadless area destruction to look at more than the land allocation issue and address the biological implications. **(letter #40)**

We will be destroying the roadless areas. Land allocation was not the driving factor in the development of the treatments. Vegetation was viewed from the landscape level and treatments were laid out on the basis of need and forest health. The biological implications of entry into roadless areas will be reflected in the Determination of Effects, should they be part of the chosen alternative.

• There was no analysis of the, impact on wildlife, of implementing a defined timber rotation regime into stands which are currently designated as unsuitable? And what are the expected cumulative impacts on wildlife that will occur from conversion of unsuitable lands to timber harvest regime? **(letter #39)**

The development of treatments were driven by the need to restore ecosystem structure and function more than land allocation. Initially, many species may be impacted for the short-term (old growth dependent). However over the long-term, most of the wildlife species in the area will benefit from the emulation, if not restoration, of historic structure and function within this ecosystem.

8. General Comments In Relation to Wildlife.

• Please demonstrate how wildlife needs were instrumental in selection of units to be harvested and burned in this entry period. **(letter #39)**

We did not base placement of units specifically upon wildlife needs. They were a factor but not the driving force behind unit placement. Wildlife needs were considered in a variety of ways. Units within the warm/dry types have been chosen to maintain overstory as an old growth type. The thin from below method should maintain the conifer savannah. The timber burn units will be laid out in overmature, dying

stands which will benefit primary and secondary cavity nesters alike. The harvest and burn units in the cool moist cover types are much smaller than would have occurred naturally thus maintaining more cover in relation to vegetation altering event. Alternative C was developed specifically to maximize big game security. Leaving 25 percent of each unit for future old growth and creating snags, all of these things were incorporated based upon wildlife needs. The end product should be a full range of available habitat for resident and transient wildlife.

• Please provide the basis for determining that wildlife in the Implementation Area are experiencing significant habitat problems that will be addressed with the proposed management regime. **(letter #39)**

Most of the serious habitat problems are laid out within the FEIS and have to do with the heavy road density within the area. Most of the alternatives will reduce road density in various ways for comparison. Other habitat problems have to do with the change of habitat as a result of fire exclusion. If one reads the Big Belts document, which is tied to the Forest Plan, then the basis of this project becomes much more clear.

• The need for the proposed management regime for wildlife, an integral part of the ecosystem, was never demonstrated. **(letter #39)**

The need for the proposed management regime may be easily linked to wildlife if one considers that abiotic processes are being restored to the area. The abiotic and biotic influences are balance in a equilibrium. For most every abiotic process there is a biotic response. A portion of the abiotic process which shaped the biotic component has been missing for 80 years, while the biotic reponse has continued. This has left the vegetation out of balance and subsequently wildlife are linked to vegetation. Granted this is an oversimplification, but the concept holds true. Wildlife adapted to a specific type of vegetation are losing out as vegetation transitions into different habitat. Most of the vegetation within the Big Belts has moved to a mature to over-mature condition which skews habitats to that end of the scale. We are trying to re-establish the balance back to the middle of that scale.

H. THREATENED, ENDANGERED, SENSITIVE SPECIES and MANAGEMENT INDICATOR SPECIES

1. Comments Relative to T & E Species

• Several respondents commented on the need for more information relative to the sensitive westslope cutthroat trout. **(letters #4, 35)**

More detailed information pertaining to the westslope cutthroat, a sensitive species, is outside the scope of this DEIS to be addressed in a follow-up Biological Assessment (BA) for the selected alternative.

• The sensitive species, westslope cutthroat trout is a MIS. The lack of its persistence in any of the streams in the analysis area indicates that the aquatic ecosystems are in severe trouble. The DEIS did not include any management activities to aid in rectifying this situation. **(letter #40)**

The Proposed Action responds to the need to restore stressed forested stands to more natural disturbance processes characteristic of historic watershed conditions (DEIS, S-3 and S-4). Past land use activities responsible for the existing state of the fisheries resource have been identified in the affected environment section (DEIS III-36 and III-37) and Appendix E. Specific management activities to aid in restoring westslope cutthroat habitat are outside the scope of this action although the intent of vegetation management will be to bring watershed conditions/processes more in line to historically natural levels under which native species prevailed.

2. Comments Relative to MIS/SS.

• One respondent issued several responses regarding the use of current literature and management guidelines pertaining to Management Indicator and Sensitive Species and the apparent lack of citations, of that literature, in the assessment of potential impacts upon those species. **(letter # 39)**

Any and all verbiage concerning wildlife and the effects upon them was generated using the best and most current information available to the biologist at the time. The respondent is correct in pointing out that this information was not overly cited throughout the document. To this end portions of those sections of the document have been re-written to include citations as requested.

It is important to consider that many of these species do no have current guidelines or strategies available, and for those that do, many are outdated or not regionally compatible. Northern Region Conservation Strategies for the wolverine, lynx, fisher, and black-backed woodpeckers are currently in draft form, so were not incorporated into this analysis. Therefore, the direction of the Big Belts Integrated Analysis and currently available management strategies were incorporated where applicable. That direction is the management of available habitats in a way that emulates natural processes across the landscape which as a consequence provides for habitat diversity and sustainability over time. This course-filter management approach is based upon the assumption that as long as a full range of habitats exist over the long term then viability for the full range of resident and transient species will be sustained long-term.

• One respondent requested that the FEIS provide maps of the estimated historic, current, and planned occupied habitats in the Implementation Area for MIS/SS. **(letter #39)**

It would be redundant to provide maps of this kind. For the purposes of analysis, available habitats are presumed to be occupied unless information is produced to the contrary. It is preferred to move toward restoration of vegetative structure and function which will promote the full range of habitats available within historic range of variation. There is a description of these conditions (complete with maps), by Land Type Association and Ecological Land Unit, within the Big Belts Integrated Analysis. The Big Belts document is located in the Project File.

• What will be the expected viability of MIS/SS under the fragmentation regime developed with the Desired Future Condition? **(letter #39)**

Viability of the MIS/SS as a whole will be more dependent upon actions taken within the core, large populations to the north, south, and west than within the Big Belts. The Big Belts are on the fringe of the ranges of most MIS/SS. Most of the corridors and linkages to the Belts have been disrupted or eliminated by development of areas surrounding them ie. the valleys. Therefore, viability of MIS/SS in the Belts is going to be a problem whether action is taken or not. The Helena National Forest has subsequently decided move toward restoration of historic structure and function of the ecosystems, within our influence and ability, to provide a full range of available and sustainable habitats into the future. Should we lose any of these species within the Belts then measures will be taken to restore them, but the habitats must be there for them to return to. This would be the long term desired result of any actions taken within the Belts. Consequences regarding fragmentation have been addressed more fully within the FEIS and within the responses of this section.

• The historic conditions for MIS/SS were never displayed or compared to existing or planned conditions in any definitive manner. **(letter #39)**

The historic vegetative condition was displayed effectively. It is only an extrapolation of known habitat requirements that is required to establish historic condition for these species. Similarily, the same holds

true for the desired future condition. The Big Belts Integrated analysis addresses these questions in moderate detail and is available for review.

• Please display what estimated historical viability levels were for MIS/SS, and how these conditions will be achieved under the proposed management regime in the Implementation Area. **(letter #39)**

The historical viability levels may also be tiered to historic vegetative condition under the assumption that available habitats were occupied. For some species the Big Belt probably served as population sink area with animals moving in only to die out as a result of natural processes such as fire. Local extinction was and is a continuing factor for viability. The biggest difference from historic to planned conditions is the fact that most linkages for migration/dispersal to and from the Belts are disrupted if not destroyed, but our assumption is that available habitats are occupied. Historic condition for these species is more fully discussed in the Big Belts Integrated Analysis.

• The consequences of the lack of adherence to IMS guidelines needs to be discussed such as the snags necessary for black-backed woodpecker. **(letter #40)**

If one looks more closely at the prescriptions, one will see that such items are compensated by the fact that emulation of natural process will compensate. For example the black-backed woodpecker, snags in the area will likely exceed the IMS guidelines as a result of timber burning, deliberate snag creation as part of slash burning, and protection of available snags with the closing of roads. Additional mitigation measures were included in the FEIS for some species for good measure.

3. Comments Relative to Sensitive Plants.

• There was no section evaluating the sensitive plant species that will be impacted by the project. There was no indication if any field surveys of sensitive plant species potential habitat have been completed. **(letter #40)**

There was a small section on the sensitive plant species which may occur within the Implementation Area on III-35 of the DEIS. Granted, this section is not the most comprehensive but it gives the bottom line. A more detailed analysis will be provided with the Determination of Effects once an alternative is chosen. A fairly comprehensive plant survey of the entire Big Belts was completed in 1993 by the Montana Natural Heritage Program. A report with the results and methodologies of the survey is available, for review, at the Townsend Ranger District.

I. RECREATION

1. Comments Relating to Recreation and Law Enforcement.

• One respondent stated that any existing roads re-opened or temporary roads built will attract ATV's and four wheel drive enthusiasts. They feet that these roads will be difficult to close once use is established on them. **(letter #2)**

One of the assumptions made at the beginning of this analysis, was that there would be no new net increase in opened roads as stated on page A-1 of the DEIS. In fact, the total amount of existing opened roads decreases with all action alternatives. All new roads with each action alternative will be closed through recontouring or with slashing/debris/earthen barrier and revegetation. Appendix A, page A-2 states that temporary road closures, such as gates or earthen barriers, would be considered to restrict access until more permanent closures can be completed once treatment is done. This practice should prevent motorized recreation use from getting established.

• A respondent stated that they favor the use of area closures versus road closures as they are not as difficult to enforce. **(letter #18)**

Much of the Wagner/Atlanta Implementation Area is within existing area closures that restrict motorized vehicle use during various times of the year (page II-59-62 of the DEIS). A travel plan for the Big Belt Mountains will be initiated in 1996. At that time, areas closures will be strongly considered as a travel management tool.

2. Comments Relative to Big Game Security and Motorized Vehicle Access.

• A respondent expressed concern about harvesting timber in the Wagner Gulch area as they felt this would affect big game security during the hunting season resulting in more travel restrictions. **(letter #11)**

Big game security, during the hunting season, has been identified as issue #1 in the DEIS (page II-2). Alternative C was developed in response to this issue. With this Alternative, no timber harvest is proposed in the Wagner Gulch area. Big game security has been identified as being more limiting in the northern portion of the Wagner/Atlanta Implementation Area as compared to the southern half as identified in the elk portion of Chapter III. This comment will be considered during the decision making process.

J. ROADS

1. Comments Relating to Road Closures.

• One respondent stated that all road and trail closures need to apply to all users, not just motorized. **(letter #33)**

Roads are open or closed for specific uses for specific reasons. Often closures or restrictions apply only to motorized vehicles because the effects of vehicles are different and sometimes more impactive than other modes of travel such as foot or horseback. Examples of the kinds of impacts include noise, rutting/erosion, and the potential for the spread of noxious weeds. The are many miles of roads and trails open for motorized vehicle use on the Forest.

• One comment stated that roads are extreme departures from historic conditions and are rarely evaluated as significantly changing ecosystem function and structure. **(letter #40).**

Roads and their effects are considered and a part of the analyses that are done for wildlife, soils/ watershed, recreation, and other resources. One of the reasons all of the action alternatives close all of the newly constructed roads is to maintain wildlife habitat and watershed conditions that more closely resemble those that existed historically.

It is also important to note that the desired conditions are an integration of ecosystem management and the direction provided in the Forest Plan. Both the Forest Plan and ecosystem management recognize the importance of the social aspects of our society. This includes roads and the activities that are dependent on them. The melding of the Forest Plan with the principles of ecosystem management is pointing in a direction that looks at things more holistic and puts more emphasis on sustainability. The efforts to do these things must be done in context with the Forest Plan, which itself was designed to provide a balance of goods and services into perpetuity (sustainability).

• A respondent felt the Forest has failed to develop and display a long term road management strategy for the Implementation Area. The public has no clear concept of what roads will remain open, will be closed, or what areas will be managed to provide elk security. Maps of a reasonable scale need to be provided. The

rationale for the varying levels of road closure, both year long and during the hunting season, and road management guidelines among the alternatives is unclear. Perhaps the Forest Service can provide further discussion and explanation of this. **(letters #38, 39, 27)**

The Forest Plan sets the direction for the long term road management policy. The roads to be closed and left open in this Implementation Area are shown on the alternative maps and/or are noted in Appendix A. The elk security areas are evaluated and displayed by alternative in Chapter IV. It should also be noted that a Big Belts Travel Plan update/revision is scheduled for 1996. Starting in 1996 travel management across the entire mountain range will be reviewed and evaluated with public involvement.

Action alternative maps on a scale of 2.64" to the mile with topographic features are in the Project File. These also display the roads to be closed by alternative. Due to the large Implementation Area, these are large maps and impractical to place in the document.

- The rationale for the varying levels of road closure, both year long and during the hunting season, among the alternatives us unclear. Perhaps the Forest Service can provide further discussion and explanation of this. **(letter #38)**

Appendix A has been changed to make the closures and reasons for the closures more clear. All the seasonal road closures are in the fall for the purposes of providing big game security and hunting opportunity.

- One respondent asked what the expected total road corridor density is that will be required to achieve the prescribed management regime? **(letter #39)**

Road densities are displayed by alternative in the elk effects analysis. See also the response above related to the Forest Plan. The gray wolf analysis added to Chapter IV also speaks to fragmentation and corridors.

- One group of respondents stated that they prefer no new road in Lind Creek. It may be possible to access this area from Beaver Creek via an existing road. **(letter #1)**

The Forest Service has no legal right of way across the private land in Beaver Creek. Road construction is needed with Alternatives A, D, and E. In both Alternatives A and E, the roads would be recontoured and revegetated upon completion of slash piling. In Alternative D, the S/D/EB/R treatment would be used. The net result of all these treatments is that a road in useable condition would only be in place long enough to harvest trees and treat the slash. After treatment, the road would be back in vegetative production with access to the area being the same as it was prior to the building of the road. There is no road into Lind Creek in the other alternatives being considered.

- An opinion was expressed that for conducting prescribed burns; it should be possible to carry this out without producing any new or re-opening any old roads. **(letter #2)**

There are no new roads being built for the sole purpose of accessing areas for prescribed fire nor are there any old roads being reopened for this purpose. This is the case for all alternatives.

- A comment was received that felt road obliteration or, putting it back to grade, should be considered only where other road closure methods are not effective. **(letter #19)**

Except for Alternative A, which uses all temporary roads and has them recontoured after treatment, all other roads in the other alternatives were evaluated for various "closure" options other than simply recontouring. These treatments are explained and documented in Appendix A.

• It was stated that the Atlanta/Mule road should be, at the very least, closed in its entirety from 9/1 through the hunting season. Also the southern portion of the road should be obliterated. We recommend the entire road be obliterated from its beginning at the Forest boundary. **(letter #27)**

Alternative E does propose to physically close the entire length of the system road in Atlanta Creek with a combination of earthen barriers and ripping/seeding. Currently the road is closed from October 15 thru the May 15. The Big Belts travel plan revision will begin in 1996. Depending on the decision made with this project, the travel plan revision would also provide an opportunity to propose changes to the existing restrictions.

K. ROADLESS AREAS

1. Comments Relative to Roaded Access and Treatments In Roadless Areas.

• Several respondents stated that they did not want to see additional roading or vegetation treatment activity in the Cayuse Mountain, Irish Gulch and Camas Creek Roadless Areas within the Big Belt Mountains. Some respondents shared this concern, but they were specific to just the Camas Creek Roadless Area. **(letters #36, 34, 21, 23, 10, 8, 1, 20, 4, 5)**

Alternative E of the DEIS was developed from earlier public scoping efforts that addresses concerns for avoiding impacts to inventoried Roadless Areas (issue 3 in the DEIS, page II-3-4, II-21-24, II-31 and II-33). This Alternative involves no roading or vegetative treatments within the Cayuse Mountain, Irish Gulch or Camas Creek Roadless Areas. The existing condition of these roadless areas is addressed on III-57-63 and the effects of each action alternative on the roadless areas is addressed on IV-52-59 of the DEIS. Your comment will be considered in the decision making process.

• Some respondents stated that there are several discrepancies between Map III-9, Inventoried Roadless Areas; and Tables II-1 to II-5 for each of the action alternatives within the DEIS. **(letters #38, 32)**

In reviewing the DEIS, several mapping and labeling errors were identified, including the ones you have identified. Thank you for pointing these out. These errors have been corrected and these corrections will be shown in the final W/A EIS.

• One respondent noted that there are several roads located within Roadless Area boundaries. Because of this, they suggest that a discussion is added to the FEIS regarding road density vs. roadless area designation to help explain this to the public. **(letter #38)**

Roadless areas within the Helena National Forest were identified in the 1970's and early 1980's during the Roadless Area Review and Evaluation process (RARE I, II and re-evaluation efforts). These roadless area evaluations were done following specific national criteria. Part of the criteria involves roadless definitions as shown below:

***1) ROADLESS AREAS** - An area of undeveloped Federal land within which there are no improved roads maintained for travel by means of motorized vehicles intended for highway use. Generally exclude narrow projecting tentacles or fingers unless they meet the criteria for "Roadless Islands" below.*

***2) ROADLESS ISLANDS** - A roadless area that is surrounded by permanent waters or that is markedly distinguished from surrounding lands by topographical or ecological features such as prescipices, canyons, thickets or swamps.*

***3) IMPROVED ROAD** - A constructed or maintained vehicle way for the use of highway-type vehicles having more than two wheels.*

During the roadless area re-evaluation effort that was done in 1983, areas that contained constructed roads as described above that were missed during the earlier evaluations or were built since roadless areas were identified, were excluded from the roadless areas by altering the boundaries. Also, many of the roadless areas included private land within their boundaries and the roaded condition of these private lands were not considered in the roadless evaluations.

Most of the "roads", on federal land, that you are referring to do not meet the criteria previously described, but are jeep trails or two track trails that were created through motorized vehicle use. Most of the "roads" referred to in chapter III, page III-59 to III-63 fall into this category. There are a few roads that were incursions into the roadless areas that occurred since their designation and they are also addressed in chapter III.

The three roadless criteria listed above will be incorporated in the roadless section of Chapter III of the FEIS.

- Some respondents opposed any further road building or logging in the Big Belt Mountains. **(letters #36, 15)**

A form of this option was addressed as Alternative I (utilizing prescribed fire only), an alternative identified, but eliminated from detailed study. It was dropped from detailed study because of the conflict with the Forest Plan goals of using commodities from suitable lands as indicated on page II-30 of the DEIS.

Also, Alternative B addresses doing nothing and is analyzed in detail in the DEIS. Your comment will be considered in the decision making process.

- One respondent stated that treatment of areas in inventoried roadless areas should be allowed. **(letter #31)**

This would allows us to move towards the desired conditions for nonforested and forested vegetation within the Wagner/Atlanta Implementation Area as indicated in the Helena Forest Plan and the Big Belts Landscape Analysis. This is consistent with the Purpose and Need for Action as identified in Chapter I.

- Some respondents stated that no logging or road building should be done in roadless areas that are included in current wilderness legislation, particularly Pat William's Wilderness Bill which includes the Camas Creek Roadless Area. **(letters #23, 16, 36, 10)**

During the time this analysis was initiated, the William's Bill was the only wilderness bill being considered by Congress as indicated on pages III-61-62 of the DEIS. This only affected a portion of the Camas Creek Roadless Area. No treatments or road building are proposed in this area. There appears to be a slight mapping error for Alternative E which shows that treatment units E-3 and E-38 partially encroaches within the proposed wilderness boundary. These units will be moved or altered to avoid encroaching into this area.

Currently there are no roadless areas being considered by congress for wilderness at this time. The Cayuse Mountain and Irish Gulch Roadless Areas have not been considered in any recent Montana Wilderness legislation as indicated on III-59-60 of the DEIS. Your comment will be considered in the decision making process.

- Comments stated that no treatments should be done in roadless areas, at least for the next 5-10 years while we are in the initial stages of implementing Ecosystem Management practices, as there are enough lands that need to be restored or improved outside of roadless areas. **(letters #37, 36)**

The Big Belts Landscape analysis has shown us that much of the forested and grassland ecosystems within the Wagner/Atlanta Implementation Area are in poor health and have departed substantially from their historic distribution pattern and densities. These ecosystems do not stop at the roadless areas boundaries, but extend throughout the Implementation Area. Since approximately 66 percent of the Wagner/Atlanta Implementation Area is made up of roadless areas, many of the alternatives address vegetation treatments within the roadless areas in order to more fully achieve the purpose and need of the Proposed Action and the integrated desired condition identified in the Helena Forest Plan and the Big Belts Landscaped Analysis. Alternative E is responsive to this comment. This comment will be given full consideration during the decision making process.

• The belief that the remaining roadless areas should be left for wilderness, wildlife, non-motorized recreation and watershed was expressed. **(letters #15, 10)**

This concern is addressed in Alternative E and to a lesser extent, Alternative B in the DEIS. This comment will be considered during the decision making process.

• One respondent indicated that they would not support the building of roads and logging activity during the month of September in the Irish Gulch Roadless Area as this area is used heavily by elk during the rut. **(letter #11)**

The effects of vegetation treatments and road construction on elk vulnerability during the hunting season was identified as part of the initial public scoping efforts. This concern became issue #1 as shown on page II-2 of the DEIS. Alternative C was developed in response to this issue and was analyzed in detail. The effects on elk during the rut was not specifically addressed in the DEIS, though bow season begins about September 1. Most of the existing roads that access the Irish Gulch Roadless Area are closed or are proposed in many of the alternatives to be closed during this time.

Most of the Irish Gulch Roadless Area is within an area closure that is currently in effect from October 15 to June 30 for all vehicle except snowmobiles which are not allowed in this closure area. The closure was established for wildlife security, winter range and elk calving. This comment will be considered during the decision making process.

• A suggestion was made that dead timber and brush in the Irish Gulch Roadless area be cleaned out. It is very thick and it is difficult to ride a horse through it. There is lots of downed timber between Thomas and Benton Creeks. This is a fire hazard. **(letter #29)**

Several treatments, burning and timber harvest, are proposed in this area with all the action alternatives. Alternative E has no treatments in this area while Alternatives A and C emphasize burning and Alternatives D and F emphasize timber harvest with some grass burning. Irish Gulch itself is outside the Implementation Area and was not considered for treatment with this project.

L. SPECIAL USES

1. Comments Relating to Livestock Grazing.

• Several respondents are concerned over what will be done with the livestock when areas are burned. They feel that the DEIS did not adequately account for deferment or nonuse and the impacts of that to the rancher. **(letter #'s 32, 31, 41)**

The scheduling of treatment areas will be done in a manner that will impact the livestock operator as minimally as possible. Adequate time will be given to allow the operator to make adjustments should there be a need to rest the allotment during the season prior to burning. Since the units are scattered throughout the Implementation Area and most of the units are in secondary range, the existing grazing

systems may be modified to accommodate the need for fine fuel retention and successful burning. Following the burning, monitoring will be done to determine if a late season, light use may be allowed in the treated areas. If there are allotments that cannot be modified without having a shorter season, the operator will have to stand that cost. If there are any allotments with nonuse, the affected operator will have preference for using these allotments to offset the shorter season use on their own allotment. Any nonuse on the treated allotments will be resource protection nonuse instead of personal convenience nonuse.

- One respondent wanted to know the impact of this project on the development of the allotment management plans that are in the planning process now. **(letter #32)**

The allotment management planning effort in the Wagner/Atlanta Implementation Area is continuing with the analysis of the alternatives for that project. The decision will be implemented in the 1996 grazing season. Implementation of the burning or harvesting will be scheduled to minimize impacts to the livestock operator.

- One respondent feels that we should address the needs of livestock permittees to have motorized access within the allotments to properly manage the range and their livestock. **(letter #19)**

Motorized access within allotments for allotment management will be provided for in compliance with the existing travel plan. The exception to this would be through a travel permit for the purpose of either work done to construct/reconstruct structural improvements needed to manage the allotment or to access a high maintenance improvement such as a pump and storage tank facility. Any exception is taken on a case-by-case basis and a permit is required.

- One respondent disputed our information about the history of the grazing allotments in the area. He felt that the range resource damage was done by horses in the early years and the allotment fences were put in in the late 1950's rather than the 1970's. **(letter #29)**

Although not fully documented in the DEIS, there is information in the Big Belts Landscape Analysis to support the contention that horses play a role in affecting the vegetation in the Big Belt Mountain Range. There is evidence throughout old range files showing trespass horse use from early spring to early winter. Additionally, there was a large population of wild horses in the Missouri River and Smith River valleys. There is no formal documentation as to numbers or descriptive effects. It is well documented that there were many more livestock using the rangelands from the later 1800's to around the 1950's when more intensive management of livestock on public lands was addressed.

Records show that many of the Forest boundary fences were built in the 1950's. In the later 1960's and early 1970's, allotment management plans were formally developed. Many of the sheep permits were consolidated and reduced or concerted to cattle allotments. At this time, a significant amount of range improvement development was done. This included water development and interior management fencing.

M. ACCESS

1. Comments Relating to Access.

- A request was made by a miner to access his mining claim on the 'new road' and to insure that the marker trees to his claim are left during and following harvest. **(letter #25)**

The DEIS specifically states that none of the new roads would remain open for public use, except for short term use such as fuelwood gathering (II-6). This will not change in the final EIS. All new roads will

be closed and ultimately slashed and revegetated. Access to the mining claim would have to be from where it is currently.

Claim trees will be identified and protected as requested.

• One respondent wished to pursue an administrative easement across private property to access the Beaver Creek area for timber harvest activity. **(letter #6)**

Based on the location of the harvest units in each of the alternatives and the current roading system, there is no need to pursue an administrative easement through private lands into the Beaver Creek area. Additional road building described by alternative was designed to access the Beaver Creek area so as to offset costs of any additional road building that would be needed from the Forest boundary to the harvest units in Beaver Creek. Several landowners in the Beaver Creek drainage would be impacted if an administrative easement was pursued.

N. FIRE PROTECTION

1. Comments Relating to Damage Resulting From Burning.

• One respondent felt that in places where the duff is thick the trees should be treated by hand or mechanically and not by burning. **(letter #29)**

This is a very good point, as burning thick layers of duff when dry can lead to excessive smouldering. Smouldering for an extended period around the base of trees can kill them by killing the cambium layer at the root collar. To minimize this problem most burns will be conducted during the spring time of the year when duff moisture levels are high. High duff moisture levels will reduce the possibility of damage resulting from excessive smouldering. In some instances, especially during fall burning, the duff layer will be pulled back from the base of the trees. This pull back will not occur on all trees but only the largest ones that have the deepest accumulation of duff.

• A question was raised concerning the lack of analysis of the potential for escaped prescribed fire. Would trees be salvaged if accidentally killed by an escaped prescribed fire? **(letter #39)**

An indepth site specific risk analysis is conducted for each unit burned. This is done through the burn plan which is reviewed and approved by the District Ranger. The potential for escape is always present with prescribed burning. Northern Region wide the annual number of prescribed burns that escape is approximately one or two percent. The Regional average for acres burned by escaped management ignited prescribed fires is approximately 100 acres per year.

There is no plan to salvage any trees that may be burned accidentally through prescribed fire. Any action of this nature would require another site specific environmental analysis.

O. ECONOMICS

1. Comments Relative to the Economic Analysis of the Alternatives

• Several respondents commented on the Economic Analysis. Two comments centered on the costs of grass burns which are for improvement of range or wildlife habitat. Commenters suggested these costs should not be charged against the timber receipts for the project as it affects whether or not the timber harvest portion of the project is above or below cost. **(letters #12, 19)**

For the economic analysis in the FEIS, the costs of prescribed burning in grasslands and timber stands not being harvested have been separated out. These costs are displayed separately and are not used in calculating the B/C and PNV for the action alternatives.

- Several respondents stated that the alternatives should be economically viable and include the "real costs" of road building, FS planning, EIS documentation, weed control, and the lost values of wildlife, old growth, and non-motorized recreation. **(letters #15, 23)**

The costs used in the economic analysis for the FEIS do include those for road building, timber sale planning and layout, logging, hauling, regeneration, site prep, and slash treatments. The costs of additional weed control needed as a result of alternative implementation have also been included in the FEIS.

The noted "lost values" have not been used in the economic analysis for the following reasons: 1) The actual economic effects resulting from impacts to the types of resources noted, wildlife, old growth, non-motorized recreation, are very difficult to quantify, especially in a relatively small area like the Implementation Area. 2) Also, the environmental effects on the *resources mentioned, old growth, wildfire and recreation have been evaluated in Chapter IV of the FEIS.*

P. MAPS

1. Comments Relative to Maps in the DEIS.

- Respondents indicated that map III-2 is of poor quality. **(letter #38)**

We agree and it was decided the map really did not serve a substantial purpose. The map has been removed from the FEIS and is located in the Project File.

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REFERENCES CITED

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Achuff, P., and L. Schassberger. 1991. Status Review of *Goodyera repens*, USDA Forest Service-Region 1, Lewis and Clark National Forest. Montana Natural Heritage Program. 52 pp.

Allen, S. 1988. Montana Bioeconomics study: results of the elk hunter preference suvey. Montana Dept. of Fish, Wildl. and Parks, Helena. 98pp.

Ambuel, B., and S.A. Temple. 1982. Songbird populations in southern Wisconsin forests: 1954 and 1979. J. Field Ornithol. 53: 149-158.

Amman, Gene and McGregor, Mark; April, 1985; Integrating Management Strategies for the Mountain Pine Beetle With Multiple-Resource Management of Lodgepole Pine Forests. USDA, Intermountain Forests and Range Experiment Station, Ogdon, Utah. General Technical Report INT-174, p29.

Antos, J.A. Bruce McCune and Cliff Bara. 1983. The Effect of Fire On An Ungrazed Western Montana Grassland. American Midland Naturalist. 110 (2): 354-364.

Askins, R.A. and M.J. Philbrick. 1987. Relationship between the regional abundance of forest and the composition of forest bird communities. Biol. Conserv. 39:129-152.

Aune, K., and W. Kasworm. 1989. Final report East Front grizzly studies. Montana Dept. of Fish, Wildl. and Parks. Helena. 332pp.

Aune, K. and T. Stivers. 1982. Rocky Mountain Front grizzly bear monitoring and investigation. Mont Dept. Fish, Wildl., and Parks. Helena. 143pp.

________. 1982. Rocky Mountain Front grizzly bear monitoring and investigation. Mont Dept. Fish, Wildl., and Parks. Helena. 143pp.

Bailey, T.N., E.E. Bangs, M.F. Portner, J.C. Malloy, and R.J. McAvinchey. 1986. An apparent over-exploited lynx population on the Kenai Peninsula, Alaska. Journal of Wildlife Management. 50:279-290.

Baseline Air Quality and Meteorological Data Summary of the Diamond Hill Project. 9/89 - 10/90.

Brainerd, S.M. 1985. Reproductive ecology of bobcats and lynx in western Montana. M.S. Thesis. University of Montana, Missoula. 85 pp.

Brittingham, M.C., and S.A. Temple. 1983. Have cowbirds caused forest songbirds to decline? Bioscience 33:31-35.

Broadwater County Historical Society, 1987, Broadwater Bygones, p.273-283.

Brundinge, G., and T. McCabe. 1986. Summer habitat use by bighorn ewes and lambs. *in* G. Joslin *ed*. Proc. Fifth Bienn. Symp. North. Wild sheep and Goat Council 1986. Northern Wild Sheep and Goat Council. Helena, MT. 435pp.

Buol, S., Hole, F. and McCracken, R.; 1980; Soil Genesis and Classification. Iowa State University, Ames, Iowa. pp. 99-100.

Carlsen, T. Pers. Comm. 1991: MDFWP biologist, Townsend.

Carlson, Clinton, Fellin, David and Schmidt, Wymann; 1983; The Western Spruce Budworm in the Northern Rocky Mountain Forest: A Review of Ecology, Insecticidal Treatments and Silvicultural Practices. Montana Forest and Conservation Experiment Station, School of Forestry, University of Montana, Missoula, Montana, p.84.

Carlson, T., 1990, Personal Communication, Montana Department of Fish, Wildlife and Parks.

Caughley, G. 1979. What is this thing called carrying capacity? Pages 2-8 *in* M.S. Boyce and L.D. Hayden-Wing *eds*. North American Elk: Ecology, Behavior and Management. Univ. of Wyo., Cheyenne. 294pp.

Chamberlin, T.W., R.D. Harr, and F.H. Everest. 1991. Timber harvesting, silviculture, and watershed processes. American Fisheries Society Special Publication 19:181-205.

Clayton, J. Kellog, G. and Forrester. N.; undated; Soil Disturbance-Tree Growth Relations in Centrail Idaho Clearcuts. USDA Intermountain Research Station Research Note INT-372.

Cline, R.G., G. Cole, W. Megahan, R. Patten, J. Potyondy. 1981. Guide For Predicting Sediment Yields From Forested Watersheds. USDA Forest Service, Northern and Intermountain Regions, Missoula, MT and Ogden, UT. 42 p.

Clutton-Brock, T.H., F.E. Guinness, and S.D. Albon. 1982. Red Deer:Behavior and Ecology of Two Sexes. Univ. Chicago Press, Chicago. 378pp.

Constan, K. 1972. Winter foods and range use of three species of ungulates. J. Wildl. Manage. 36(4):1068-1076.

Craighead, J.J., F.C. Craighead, and R.J. Davis. 1963. Field Guide to Rocky Mountain Wildflowers. Houghton Mifflin Co.:Boston. 277pp.

Crocker-Bedford, D.C. 1990. Goshawk reproduction and forest management. Wildl Soc. Bull. 18:262-269.

DeGraaf, R.M., V.E. Scott, R.M. Hamre, L. Ernst, and S.H. Anderson. 1991. Forest and rangeland birds of the United States. USDA Forest Service Handbook 688. 625 pp.

Dixon, K.R. 1982. Mountain lion (*Felis concolor*). Pages 711-727 *in* Chapman, J.A. and Feldhamer, G.A. *eds.* Wild mammals of north america -- biology, management, and economics. Johns Hopkins Univ. Press. Baltimore and London. 1147pp.

Dobkin, D.S. 1992. Neotropical Migrant Landbirds in the NOrthern Rockies and Great Plains. U.S.D.A. Forest Service Northern Region. Publication No. R1-93-34. Missoula, Mt.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1992. Birds in jeopardy: the imperiled and extinct birds of the United States and Canada including Hawaii and Puerto Rico. Stanford University Press, Stanford, California.

Estes, R.D. 1979. Ecological aspects of bighorn sheep populations in southeastern Washington. M.S. Thesis. Washington State Univ., Pullman. 124pp.

Fairman, L., and Genter, D., 1989. An Overview of the Ecology of the Boreal Owl (Aegolius funereus) and Results of the 1989 Boreal Owl Survey on the Helena National Forest. Montana Natural Heritage Program.

Feist, F. Pers. comm. 1992. MDFWP biologist, Great Falls, MT.

Flook, D.R. 1970. A study of sex differential in the survival of wapiti. Can. Wildl. Serv. Rep. Ser. No. 11. Ottawa: Queens Printer. 71pp.

Franzmann, A.W. 1978. Moose. Pages 67-81 *in* Schmidt, J.L. and D.L. Gilbert *eds.* Big Game of North America -- Ecology and Management. Stackpole Books. Harrisburg, PA. 494pp.

Gates, J.E., and L.W. Geysel. 1978. Avian nest dispersion and fledgling success in field forest ecotones. Ecology 66:1211-1214.

Geist, V. 1971. Mountain Sheep -- a study in behavior and evolution. Univ. Chicage Press, Chicago and London. 383pp.

Goggans, R. 1986. Habitat use by flammulated owls in northeast Oregon. Thesis. Oregon State University, Corvallis, Oregon.

Graham, R. Harvey, A. Jurgensen, M.m Jain, T. Tonn, J., Page-Dumrose, D.; 1/30/94 Draft; Recommendations for Managing Coarse Woody Debris in Forests of the Rocky Mountains, USDA, FS, Intermountain Research Station, Moscow, ID Draft Research Paper.

Green, P, J. Joy, D. Sirucek, W. Hann, A. Zack, and B. Naumann. April 1992. Old-Growth Forest Types of the Northern Region. Northern Region, USDA Forest Service. Missoula, MT. 60pp.

Greer, S. 1987. Home range, habitat use, and food habits of black bears in South-central Montana. M.S. Thesis. Montana State Univ. Bozeman. 91pp.

Harvey, A. Meurisse, R. Geist, M., Jurgensen, M. McDonald., G., Graham, R. and Stark, N.; 1989; Managing Productivity Processes in the Inland Northwest-Mixed Conifers and Pines. Oregon State University, College of Forestry. Included in proceedings edited by Perry, et. al; Maintaining the Long-Term Productivity of Pacific Northwest Forest Ecosystems.

Hayward, Gregory D., Hayward, Patricia H., Garton, Edward O., 1993. *Ecology of Boreal Owls in The Northern Rocky Mountains, U.S.A.* The Wildlife Society.

Hayward, G.D. and J.Verner, tech. editors. 1994. Flammulated, boreal, and great grey owls in the United States: a technical conservation assessment. Gen. Tech. Rep. RM-253. Fort Collins, Colorado: USDA Forest Service, Rocky Mountain Forest and Range Experiment Station.

Hayward, G.D. 1989. Habitat use and population biology of boreal owls in the northern Rocky Mountains, USA. Ph.D. Dissertation, University of Idaho, Moscow. 113 pp.

Hayward, G.D. 1983. Goshawk nest habitat selection in Region 1. Unpubl. Rep. USDA Forest Service, Northern Region, Missoula, Montana. 21pp.

Hill, E.P. 1982. Beaver (*Castor canadanesis*). Pages 256-281 *in* Chapman, J.A. and Feldhamer, G.A. *eds.* Wild mammals of north america -- biology, management, and economics. Johns Hopkins Univ. Press. Baltimore and London. 1147pp.

Hillis, M.J., M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. McCleerey. 1991. Defining elk security: the Hillis paradigm. Pages 38-43 *in* A.G. Christensen, L.J. Lyon and T.N. Lonner, comps., Proc. Elk Vulnerability Symp., Montana State Univ., Bozeman. 330pp.

Hillis J.M., M.J. Thompson, J.E. Canfield, L.J. Lyon, C.L. Marcum, P.M. Dolan, and D.W. Mcleary. 1991. Defining elk security: the Hillis paradigm. Paper presented at Elk Vulnerability Workshop, Montana State University, Bozeman, Montana. 23 pp.

Holtzer, K. A. 1989. Ecology of Merriam's wild turdey in the Helena National Forest. Unpub. Masters Thesis. Montana State Univ., Bozeman. 45 pp.

Hook, D. Pers. Comm. 1991. MDFWP biologist, Anaconda.

Houston, D.B. 1982. The norhtern Yellowstone elk -- ecology and management. Macmillan Publishing Co., Inc. New York and London. 474pp.

Howe, R.R. and R. Ritcey. 1987. Distribution, habitat selection, and densities of flammulated owls in British Columbia. Pages 249-254, Proceedings of a Symposium, USDA Forest Service. Gen. Tech. Rep. RM-142.

Hunter, M.L. 1990. Wildlife, forests, and forestry: principles of managing forests for biological diversity. Prentice-Hall Inc.

Irving, J.S. and T.C. Bjornn. 1984. Effects of Substrate size composition on survival of kokanee salmon and cutthroat and rainbow trout embryos. University of Idaho, Cooperative Fishery Research Unit. Technical Report 84-6. Moscow.

Irwin, L.L. and F.M. Hamond. 1985. Managing black bear habitats for food items in Wyoming. Wildl. Soc. Bull. 13:477-483.

Jensen, W.F., T.K. Fuller, and W.L. Robinson. 1986. Wolf, *Canis lupus*, distribution on the Ontario-Michigan border near Sault Ste. Marie. Can. Field Nat. 100:363-366.

Jonkel, C.J. and I.M. Cowan. 1971. The black bear in the spruce-fir forest. Wildl. Monog. 27. 57pp.

______. 1978. Black, brown (grizzly) and polar bears. Pages 227-248 *in* Schmidt, J.L. and D.L. Gilbert *eds.* Big Game of North America -- Ecology and Management. Stackpole Books. Harrisburg, PA. 494pp.

Kemp, G. 1979. The Rocky Mountain workshop group. Pages 217-236 *in* D. Burk *ed.* The Black Bear in Modern North America. Boone and Crockett Club, New York in coop. with Amwell Press, Clinton, NJ. 300pp.

Kendall, K.C. 1986. Grizzly and black bear feeding ecology i Glacier National Park, Montana. U.S. Dept. Inter., Glacier Nat. Park. 42pp.

Klein, William, January 1989; A Survey of Winter Damage in the Forests of Montana; USDA Forest Service, Northern Region, Timber Cooperative Forestry and Pest Management, Report 90-6.

Kochler, G.M. and J.D. Brittell. 1990. Managing spruce-fir habitat for lynx and snowshoe hares. Journal of Forestry. 10:10-14.

Kochler, G.M. 1988. Demographic characteristics and habitat requirements of lynx (*Lynx canadensis*) in north-central Washington. Canadian Journal of Zoology. 68:845-851.

Kruckenberg, L.L. 1988. "Wyoming's Wildlife -- Worth the Watching": management in transition. Trans. No. Amer. Wildl. Natur. Res. Conf. 53:424-430.

Lawson, B. and R. Johnson. 1982. Mountain shep (*Ovis canadensis* and *O. dalli*). Pages 1036-1055 *in* Chapman, J.A. and Feldhamer, G.A. *eds*. Wild mammals of north america -- biology, management, and economics. Johns Hopkins Univ. Press. Baltimore and London. 1147pp.

Lemke, P.L. 1994. Northern goshawk *Accipiter gentilis* habitat study. Beaverhead National Forest, Wisdom and Wise River Ranger Districts. Unpubl. Rep.

Lindzey, F.G. and E.C.Meslow. 1977. Home range and habitat use by black bears in Southwestern Washington. J.Wildl. Manage. 41(1):413-425.

Lyden, C.J., 1987, Gold Placers of Montana, Montana Bureau of Mines and Geology, Reprint 6 120pp.

Lyon, L.J. and A.G. Christensen. 1992. A partial glossary of elk management terms. Gen. Tech. Rep. INT-288. Missoula, Montana. USDA Forest Service, Intermountain Research Station.

MacDonald, L.H., A.W. Smart, and R.C. Wissmar. 1991. Monitoring Guidelines to Evaluate Effects of Forestry Activities on Streams in the Pacific Northwest and Alaska. CSS/EPA 910/9-91-001, Seattle, WA. 166 p.

Mack, J. 1988. Ecology of black bears on the Beartooth Face, South-central Montana. M.S. Thesis, Montana State Univ., Bozeman. 119pp.

Mackie, R.J., K.L. Hamlin, and D.F. Pac. 1982. Mule deer (*Odocoileus hemionus*). Pages 862-877 *in* Chapmen, J.A. and G.A. Feldhamer *eds*. Wild Mammals of North America -- biology, management, economics. Johns Hopkins Univ. Press. Baltimore and London. 1147pp.

Maj, M. 1992. Interum management; sensitive species. Unpublished paper on file at USDA, Forest Service, Townsend District Office, Townsend Mt. 18pp.

Marshall, David B., Draft 1991. *Status Of The Northern Goshawk In Oregon and Washington*. Audubon Society of Portland.

McCallum, D.A. and F.R. Gehlbach. 1988. Nest-site preferences of flammulated owls in western New Mexico. Condor 90:653-661.

McClelland, B.R. 1980. Influences of harvesting and residue management on cavity nesting birds. Pages 469-496. Environmental Consequences of TImber Harvesting in Rocky Mountain Coniferous Forests. Symposium Proceedings, September 11-13, 1979, Missoula, Montana. USDA Forest Service. GEN. Tech. Rep. INT-90, Intermountain Forest and Range Experiment Station. Ogden, Utah.

Mech, L.D. 1989, Wolf population survival in an area of high road density. Am. Midl. Nat. 121:387-389.

Montana Bald Eagle Working Group. 1986. Montana Bald Eagle Management Plan. USDI Bureau of Land Management, Billings MT. BLM-MT-GI-86-001-4352. 61 pp.

MDFWP. 1987-1992. Annual Montana Elk Hunting Harvest Surveys. MDFWP Research Bureau, Bozeman.

MDFWP. 1989. Mountain Goat Species Report, Region 4, July 1987-June 1989 (Two Year Summary). Mont. Dept. Fish, Wildl. and Parks. Mimeo. 15pp.

MDFWP. 1989-1992. Annual Montana Deer Hunting Harvest Surveys. MDFWP Reasearch Bureau, Bozeman.

MDFWP. 1991. Mountain Goat Survey and Inventory Progress Report. Region 8 Mont. Dept. of Fish, Wildl. and Parks. Helena. Mimeo. 8pp.

MDFWP. 1992. Statewide Elk Management Plan for Montana. Heidi Youmans, Comp. Mont. Dept. of Fish, Wildl. and Parks. Helena. 170pp.

Minshall, G. W., D. A. Andrews, J. T. Brock, C. T. Robinson, and D. E. Lawrence. 1990. Changes in wild trout habitat following forest fire. Pages 111-119 in F. Richardson and R. H. Hamre, eds. Wild trout IV: Proceedings of the symposium. 774-173/25037. GPO, Washington, D. C.

Minshall, G. W., and J. T. Brock. 1991. Observed and anticipated effects of forest fire on Yellowstone stream ecosystems. Pages 123-134 in R. B. Keiter and M. S. Boyce eds. The greater Yellowstone ecosystem: Redefining america's wilderness heritage. Yale University Press.

Moore, R. 1991. Breedig birds in old-growth forests: snag management for birds. Bozeman Ranger Dist., Gallatin National Forest. Bozeman, MT. 70pp.

Morgantini, L.D. and R.J. Hudson. 1981. Sex differential in use of the physical environment by bighorn sheep (*Ovis canadensis*). Can. Field Nat. 95:69-74.

Mosconi, S.L. and R.L. Hutto. 1982. The effects of grazing on land birds of a western Montana riparian habitat. Pages 221-233 *in* Wildlife-Libestock Relationsheps Symposium: Proc. 10, Univ. Idaho For. Wildl. Range Exp. Sta., Moscow.

Murie, O.J. 1951. The elk of North America. The Stackpole Co., Harrisburg. 376pp.

Nellis, C.H. 1989. Lynx. Pages 123-124. Rare, Sensitive, and Threatened Species of the Greater Yellowstone Ecosystem. Northern Rockies Conservation Cooperative, Montana Natural Heritage Program, The Nature Conservancy, and Mountain West Environmental Services.

Northern Goshawk Scientific Committee, 1991. *Management Recommendations For The Northern Goshwk In The Southwestern United States*. USDA Forest Service, Southwestern Region.

Ohmart, R.K. and B.W. Anderson. 1986. Pages 169-199 *in* Cooperrider, A.Y., R.J. Boyd, and H.R. Stuart, *eds.* Inventory and monitoring of wildlife habitat. U.S. Dept. Inter., Bur. Land Manage. Service Center. Denver, Co. xviii, 858pp.

Pac, D.F., R.J. Mackie, and H.E. Jorgensen. 1991. Mule deer population organization, behavior and dynamics in a northern rocky mountain enironment. Montana Dept. of Fish, Wildl. and Parks. Helena. 316pp.

Pardee, J.T., and Schrader, F.C., 1933, Metalliferous Deposits of the Greater Helena Mining Region, Montana, U.S. Geological Survey Bulletin 842, 318pp.

Parrett, C., Omang, R.J., and Hull, J.A. 1982, Floods of May, 1981 in west-central Montana, U.S. Geological Survey Water Resources Investigations 82-93, 20pp.

Patla, S. 1990. Northern goshawk monitoring project report. Final Report. P.O. 43-02S2-8-1931. 53 pp.

Peek, J.M. and A.L. Lovass. 1968. Differential distribution of elk by sex and age on the Gallatin Winter Range, Montana. J. Wild. Manage. 32(3):553-557.

Pelton, M. 1982. Black Bear *Ursus americanus*. Pages 504-514 *in* Chapmen, J.A. and G.A. Feldhamer *eds.* Wild Mammals of North America -- biology, management, economics. Johns Hopkins Univ. Press. Baltimore and London. 1147pp.

Picton, H.D. 1978. Climate and reproduction of grizzly bears in Yellowstone National Park. Nature 274(5674):888-889.

Raine, M.R. and J.L. Kansas. 1990. Black bear seasonal food habits and distribution by elevation in Banff national Park, Alberta. Int. Conf. Bear Res. and Manage. 8:297-304.

Reed, G.C., 1951, Mines and Mineral Deposits, Broadwater County, Montana; U.S. Bureau of Mines Information Circular 7592, 58pp.

Reichel, J.D., D.L.Genter. 1992. Sensitive animal species in the Elkhorn and Big Belt Mountains of the Helena Forest. A report by the Montana Natural Heritage Program to USDA Forest Service, Helena National Forest. 102 pp.

Restani, M. and A.R. Harmata. 1992. Survey of raptors along the upper Missouri River, Montana. Fish and Wildlife Program, Dept. of Biology, Mont. State Univ., Bozeman. 70pp.

Reynolds, R.T. and R.T. Graham et.al. 1992. Management recommendations for the northern goshawk in the southwestern United States. Gen. Tech. Rep. 217. Fort Collins, Colorado. USDA Forest Service. Rocky Mountain Forest and Range Experiment Station.

Roby, R.N., 1950, Mines and Mineral Deposits, Meagher County, Montana; U.S. Bureau of Mines, Information Circular 7540, 40pp.

Roe, Lisa S. 1992. Status Review of *Aquilegie brevistyla*, USDA Forest Service-Region 1, Lewis and Clark National Forest. Montana Natural Heritage Program. 47 pp.

Rogers, L.L. 1987. Effects of food supply and kinship on social behavior, movements, and population growth of black bears in Northeastern Minnesota. Wildlife Monogr. 97. 72pp.

Rominger, E.M., A.R. Dane, and J.A. Bailey. 1988. Shrubs in the summer diet of Rocky Mountain bighorn sheep. J. Wildl. Manage. 52(4):47-50.

ROS Reference:1 - United States Department of Agriculture, FOrest Service, APril 1990, ROS Primer and Field Guide, U.S. Government Printing Office, R6-REC-021-90.

Rosgaard, A., and C. Simmons. 1982. East Boulder big game technical report. Mont. Dep. Fish, Wildl., Parks, Helena. 58pp.

Shannon, N.H., R.J. Hudson, V.C. Brink, and W.D. Kitts. 1975. Determinants of spatial distribution of Rocky Mountain bighorn sheep. J. Wildl. Manage. 39(2):387-401.

Smith, T.S., J.T. Flinders, and D.S. Winn. 1991. A habitat evaluation procedure for Rocky Mountain bighorn sheep in the intermountain west. The Great Plains Nat. 51(3):205-225.

State Engineer's Office, June 1956, Water Resources Survey, Broadwater County, Montana, 37pp.

State Engineer's Office, July 1950, Water Resources Survey, Meagher County, Montana, 50pp.

State Engineer's Office, June 1957, Water Resources Survey, Lewis and Clark County, Montana, 59pp.

Swenson, J. 1985. Effects of hunting on black bears in Southwestern Montana. Unpubl. paper. 22pp.

Terborgh, J. 1989. Where have all the birds gone? Princeton University Press. Princeton, New Jersey.

Theil, R.P. 1985. The relationship between road densities and wolf habitat suitability in Wisconsin. Am. Midl. Nat. 113:404-407.

Thomas, J.W. and J. Verner. 1986. Pages 73-91 *in* Cooperrider, A.Y., R.J. Boyd, and H.R. Stuart, *eds*. Inventory and monitoring of wildlife habitat. U.S. Dept. Inter., Bur. Land Manage. Service Center. Denver, Co. xviii, 858pp.

Thomas, J.W. (editor). 1979. Wildlife habitats in managed forests - the Blue Mountains of Oregon and Washington. USDA Forest Service Handbook No. 553. 512 pp.

Thorne, T., G. Butler, T. Varcalli, K. Beker, and S. Hayden-Wing. 1979. The status, mortality and response to management of bighorn sheep of Whiskey Mountain. Wildlife Tech. Report Number 7. Wyo. Game and Fish Dept. Cheyenne. 213pp.

Todd, J.W. 1975. Foods of Rocky Mountain bighorn sheep in southern Colorado. J. Wildl. Manage. 39(1): 108-111.

Trefethen, J.F. On the management of mountain sheep: theoretical considerations. 1975 Pages 77-98 *in* J.F. Trefethen *ed*. The wild sheep in modern north america. Boone and Crockett Club, New York. 302pp.

Unsworth, J.W., J.J. Beecham, and L.R. Irby. 1989. Female black bear habitat use in West-central Idaho. J. Wildl. Manage. 53(3):668-673.

USFS. 1988 Soil Survey of the Helena National Forest Area.

USFS. 1992. Kissing Gipsy timber sale environmental assessment. Helena Nat. Forest, Townsend Ranger Dist.

USFS. May 1993. Big Belts Integrated Resource Analysis Documentation. Townsend Ranger District, Helena National Forest.

USFS. 1993 National Hierarchial Framework of Ecological Units; ECOMAP

Wallmo, O.C. 1978. Mule and black-tailed deer. Pages 31-42 *in* Schmidt, J.L. and D.L. Gilbert *eds*. Big Game of North America -- Ecology and Management. Stackpole Books. Harrisburg, PA. 494pp.

Stowell, R., A. Espinosa, T.C. Bjornn, W.S. Platts, D.C. Burns, and J.S. Irving. 1983. Guide for Predicting Salmonid Response to Sediment Yields in Idaho Batholith watersheds. U.S. Forest Service, Northern Region, Missoula, MT, and Intermountain Region, Ogden, UT. 50 p.

Thomas, Jack Ward, September 1979. *Wildlife Habitats in Managed Forests of the Blue Mountains of Oregon and Washington*. U.S. Department of Agriculture, Forest Service, Agriculture Handbook No 553.

State of Montana Air Quality Rules 1992. 16.8.1102, 16.8.814, 16.8.820

USDA Forest Service, 1986, Helena Forest Plan, Helena National Forest.

USDA Forest Service, 1986a, Helena Forest Plan EIS, Helena National Forest.

USDA Forest Service, Helena National Forest, 1988, Draft Soil Survey for the Helena National Forest.

U.S.D.A., Forest Service. 1989. Caring for our natural community: Region 1 - Threatened, Endangered and Sensitive Species Program. USDA Forest Service, Northern Region.

U.S. Forest Service, #688, 1991, Forest and Rangeland Birds of the United States.

USDA Forest Service Manual, FSM 2580 page 1-6

U.S. Forest Service. 1980. WRENSS. [get literature cit from Bo]

U.S. Forest Service. 1992. WATSED [literature cit from Bo]

U.S. Fish and Wildlife Service. 1984. American Peregrine Falcon Recovery Plan (Rocky Mountain/ Southwest Population). Prepared in cooperation with the American Peregrine Falcon Recovery Team. USFWS, Denver CO. 105 pp.

U.S. Fish and Wildlife Service. 1987. Northern Rocky Mountain Wolf Recovery Plan. USDI Fish and Wildlife Service, Helena MT. 119 pp.

Valentine, K., Sprout, P., Baker, T. and Lavkulich, L.; The SOil Landscapes of Bristish Columbia. The Resource Analysis Branch, Ministry of the Environment, Victoria, British Columbia.

Warren, Nancy M., *Old-Growth Habitats and Associated Wildlife Species In The Northern Rocky Mountains*. Northern Region Wildlife Habitat Relationships Program
Welch, . 1969.

Wilcove, D.S. 1985. Nest predation in forest tracts and the decline of migratory songbirds. Ecology 66:1211-1214.

Wishart, W. 1975. Report and recommendations of the rocky mountain bighorn workshop group. Pages 165-207 *in* J.B. Trefethen *ed*. The Wild Sheep in Modern North America. Boone and Crockett Club, New York. 302pp.

Witzel, L.D. and H.R. MacCrimmon. 1983. Embryo survival and alevin emergence of brook charr, *Salvelinus fontinalis*, and brown trout, *Salmo trutta*, relative to redd gravel composition. Can. J. Zool. 61: 1783-1792.

Young, B.F. and J.J. Beecham. 1986. Black bear habitat use at Priest Lake, Idaho. Int. Conf. Bear Res. and Manage. 6:73-80.

JERRY

GLOSSARY

GLOSSARY

A

AFFECTED ENVIRONMENT. The natural, physical, and human-related environment that is sensitive to changes due to proposed actions.

AGE CLASSES. Intervals (commonly 10 years) into which the age range of a tree crop is divided; also trees falling into such an interval.

AIR QUALITY. Refers to standards for various classes of land as designated by the Clean Air Act, P.L. 88-206: Jan. 1978

AIRSHED. A geographical area that, because of topography, meteorology, and climate, shares the same air.

ALTERNATIVE. A mix of management prescriptions applied to specific land areas to achieve a set of goals and objectives. Each alternative represents a different way of achieving a set of similar management objectives. Sometimes the term "action alternative" is used when it is desirable to recognize that there is a "no action" alternative under which the proposed activity would not take place.

B

BEST MANAGEMENT PRACTICES. A set of practices in the Forest Plan which, when applied during implementation of a project, ensures that water related beneficial uses are protected and that State water quality standards are met.

BIG GAME. Those species of large mammals normally managed as a sport hunting resource.

BIOLOGICAL ASSESSMENT. An evaluation conducted on Federal projects requiring an environmental impact statement, in accordance with the Endangered Species Act. The purpose of the assessment is to determine whether the proposed action is likely to affect an endangered, threatened, or proposed species.

BOARD FOOT (BF). A unit of measurement equal to an unfinished board one foot square by one inch thick. Timber volumes are often expressed in terms of thousands of board feet.

BROADCAST BURN. See prescribed burning.

C

CANOPY. The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees and other woody growth. Layers of canopy may be called stories.

CANOPY CLOSURE. The progressive reduction of space between tree crowns as they spread laterally; a measure of the percent of potential open space occupied by the collective tree crowns in a stand.

CAVE. A natural underground chamber that is open to the surface.

CAVITY. The hollow, excavated in snags by birds; used for roosting and reproduction by many birds and mammals.

CAVITY HABITAT. Snags, broken-topped live trees and down logs used by wildlife species that excavate and/or occupy cavities in these trees.

CAVITY NESTERS. Wildlife species that nest in cavities.

CLEARCUT HARVEST. A regeneration method under which the entire mature stand is cut. Some snags and potential snags may be left to benefit snag-dependent wildlife species.

CLIFF. A steep, vertical, or overhanging rock face.

CLOSED CANOPY. The condition that exists when the canopy created by trees or shrubs or both is dense enough to exclude most of the direct sunlight from the forest floor.

CLOSED ROAD. A National Forest road or segment which is restricted from certain types of use during certain seasons of the year. The prohibited use and the time period of closure must be specified. The closure is legal when the Forest Supervisor has issued an order and posted it in accordance with chapter 36 of the CFR section 261.

CODE OF FEDERAL REGULATIONS (CFR). The official, legal tabulation or regulations directing Federal Government activies.

COMMUNITY. A group of one or more populations of plants and animals in a common spatial arrangement; an ecological term used in a broad sense to include groups of various sizes and degrees of integration.

COMPARTMENTS. A geographic area delineated by a watershed drainage for management planning purposes.

CONIFER. Any of a group of needle and cone bearing evergreen trees.

CONSTRAINT. A confinement or restriction on the range of permissible choices.

COVER. Vegetation used by wildlife for protection from predators, breeding and rearing of young (hiding cover), or to ameliorate conditions of weather (thermal cover).

COVER/FORAGE RATIO. The ratio, in percent, of the amount of area in cover conditions to that in forage conditions.

CULMINATION OF MEAN ANNUAL INCREMENT (CMAI). The point at which the volume increment for a tree or stand has achieved it's highest mean value. Mean annual increment is based on expected growth according to the management intensities and utilization standards assumed in the Forest Plan. The mean annual increment is calculated by dividing the attained growth (volume) by it's corresponding age.

CULTURAL RESOURCES. The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) having scientific, prehistoric, or social values.

CUMULATIVE EFFECT. The impact on the environment which results from the incremental impact of the action when added to other actions. Cumulative impacts can also result from individually minor but collectively significant actions taking place over a period of time.

D

DEBRIS. The scattered remains of some things broken or destroyed; ruins; rubble; fragments.

DECADENT. Deteriorating; when used in reference to stand condition there are inferences of the loss of trees from the overstory and of the presence of disease, or indications of loss of vigor in dominant trees so that the mean annual increment is negative.

DECISION AREA. The geographic area defining the scope of this document and the alternatives proposed by it.

DENNING SITE. A place of shelter for an animal; also where an animal gives birth and raises young.

DISPLACEMENT AREA. An area of suitable habitat reserved for use by a local population of a wildlife species while that population is displaced from, or caused to vacate, its former habitat by disturbance from human activities.

DETRIMENTAL SOIL DISTURBANCE. Soil which is physically or chemically altered to the degree that vegetative production and health is assumed to be adversely affected.

DIVERSITY. The relative distribution and abundance of different plant and animal communities and species within an area.

DUFF. An organic surface soil layer, below the litter layer, in which the original form of plant and animal matter cannot be identified with the unaided eye.

DOMINANT. Plant species or species groups which, by means of their numbers, coverage, or size, influence or control the existence of associated species. Also, individual animals which determine the behavior of one or more other animals, resulting in the establishment of a social hierarchy.

E

ECOSYSTEM. An interacting natural system including all the component organisms together with the abiotic environment.

EFFECTS (or impacts). Environmental consequences (the scientific and analytical basis for comparison of alternatives) as a result of a proposed action. Effects may be either direct, which are caused by the action and occur at the same time and place, or indirect, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable, or cumulative.

ENDANGERED SPECIES. Any plant or animal species which is in danger of extinction throughout all or a significant portion of its range. (Endangered Species Act of 1973).

ENVIRONMENT. The aggregate of physical, biological, economic, and social factors affecting organisms in an area.

ENVIRONMENTAL ANALYSIS. An analysis of alternative actions and their predictable environmental effects, including physical, biological, economic, and social consequences and their interactions; short- and long-term effects; direct, indirect, and cumulative effects.

ENVIRONMENTAL ASSESSMENT (EA). A concise public document which serves to: (a) Briefly provide sufficient evidence and analysis for determining whether to prepare an EIS or a Finding of No Significant Impact; (b) Aid an agency's compliance with NEPA when no EIS is necessary; (c) Facilitate preparation of an EIS when necessary.

ENVIRONMENTAL IMPACT STATEMENT (EIS). A detailed statement prepared by the responsible official in which a major Federal action which significantly affects the quality of the human environment is described, alternatives to the proposed action provided, and effects analyzed.

EPHEMERAL STREAMS. Streams that flow only as a direct response to rainfall or snowmelt events. They have no baseflow.

EPIDEMIC. The populations of plants, animals, and diseases that build-up, often rapidly, to highly abnormal and generally injurious levels .

EROSION. Detachment or movement of soil or rock fragments by water, wind, ice, or gravity. Accelerated erosion is much more rapid than normal, natural, or geologic erosion, primarily as a result of the influence of activities of people animals, or natural catastrophes.

EVEN-AGED MANAGEMENT. Deliberate planned actions that result in stands of trees of essentially the same age, growing together. Clearcut, shelterwood, or seed tree cutting methods produce even-aged stands.

F

FEDERAL REGISTER. A daily publication which reports Presidential and Federal Agency documents.

FLOODPLAIN. The lowland and relatively flat areas adjoining inland and coastal waters, including, at a minimum, that area subject to a 1 percent or greater chance of flooding in any given year.

FORAGE. Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.

FOREST LAND. Land at least 10 percent occupied by forest trees or formerly having had such tree cover and not currently developed for nonforest use.

FOREST SYSTEM ROAD. A road wholly or partly within or adjacent to and serving the National Forest System and which is necessary for the protection, administration and utilization of the National Forest System and the use and development of its resources.

FUELS. Combustible materials present in the forest which potentially contribute a significant fire hazard.

FUELS MANAGEMENT. Manipulation or reduction of fuels to meet Forest protection and management objectives while preserving and enhancing environmental quality.

G

GRADIENT. The rise or fall of a ground surface expressed in degrees of slope.

H

HABITAT. The sum total of environmental conditions of a specific place occupied by a wildlife species or a population of such species.

HABITAT COMPONENT. A simple part, or a relatively complex entity regarded as a part, or an area or type of environment in which an organism or biological population normally lives or occurs.

HABITAT TYPE. An aggregation of all land areas potentially capable of producing similar plant communities at climax.

HARDWOODS. A conventional term for the wood of broadleaf trees. In the decision area these trees are generally confined to areas near water.

HEAVILY ALTERED. A term used in the Visual Management System to indicate that 20 percent or more of an area being viewed appears to be visually altered.

HIDING COVER. Vegetation capable of hiding 90 percent of a standing adult deer or elk at 200 feet or less. Includes some shrub stands and all forested stand conditions with adequate tree stem density or shrub layer to hide animals. In some cases, topographic features also can provide hiding cover.

HIGH RISK. Individual or groups of trees that are live (green) but have the physical characteristics favorable to insect infestation. Trees in this category are subject to mortality and loss of economic value.

I

INDICATOR SPECIES. See management indicator species.

INDIRECT EFFECTS. Secondary effects which occur in locations other than the initial action or significantly later in time.

INDIVIDUAL TREE SELECTION. The selection of trees for harvest based on individual tree characteristics, and their position within the stand structure.

INSTREAM FLOWS. The minimum water volume (cubic feet/second) in each stream necessary to meet seasonal streamflow requirements for maintaining aquatic ecosystems, visual quality, recreational opportunities and other uses.

INTERAGENCY GUIDELINES. A document which was originally developed in the Yellowstone grizzly bear ecosystem and later applied to all grizzly habitat through congressional mandate. Previously known as the "Yellowstone Guidelines", it identifies important, specific management measures regarding the conduct of multiple use activities in grizzly bear habitat and parameters for identifying the sensitivity of grizzly bear habitat to human activities.

INTERDISCIPLINARY TEAM. A group of resource professionals with different expertise that collaborate to develop and evaluate resource management decisions.

INTERMITTENT STREAM. A stream which flows only at certain times of the year when it receives water from springs or from some surface source such as melting snow.

J

JUXTAPOSITION. The act of arranging stands in space.

L

LAND ALLOCATION. The assignment of a management emphasis to particular land areas with the purpose of achieving goals and objectives. Land allocation decisions are documented in environmental analysis documents such as the Kootenai National Forest FEIS and Forest Land and Resource Management plans.

LANDSCAPE. The aspect of the land that is characteristic of a particular region or area.

LANDTYPE. A unit of land with similar designated soil, vegetation, geology, topography, climate and drainage. The basis for mapping units in the land systems inventory.

LARGE WOODY MATERIAL. (Also large woody debris; LWD)- Branches and/or tree trunks located within a stream channel, originating from trees growing in or near the channel. Such material is considered "large" if it is of sufficient size that it remains at least partially submerged during all but major flood events. These materials are important in stream systems because they serve a variety of functions related to channel hydraulics and morphology. Functions would include flow energy reduction due to friction and turbulence on downstream side of debris, and sediment storage on upstream side of materials. LWD is delivered to stream channels by decay and/or windfall of trees in close proximity to stream channels.

LIMITING FACTOR. The environmental influence through which the toleration limit of an organism is first reached, which acts, therefore, as the immediate restriction in one or more of its functions or activities or in its geographic distribution.

LITTER. An organic surface soil layer usually composed of identifiable leaves, branches, other vegetative material, and animal remains.

LOCAL ROAD. A road constructed to provide access to specific resource areas and log landings. As such, these roads connect terminal facilities with Forest collector or arterial roads or public highways. These roads may be developed and operated for either long-term or short-term service.

LODGEPOLE PINE. See explanation under timber type.

M

MANAGEMENT AREA. Geographic areas, not necessarily contiguous, which have common management direction, consistent with the Forest Plan allocations.

MANAGEMENT DIRECTION. A statement of multiple use and other goals and objectives, along with the associated management prescriptions and standards and guidelines to direct resource management.

MANAGEMENT INDICATOR SPECIES (MIS). A species of wildlife, fish, or plant whose health and vigor are believed to accurately reflect the health and vigor of other species having similar habitat and protection needs to those of the selected indicator species.

MATURE. On lands allocated for timber harvest, mature is defined as trees or stands that have reached rotation age, generally around 100 years. In the context of wildlife - Mature forest habitat with characteristics needed to provide habitat for species such as pine marten and pileated woodpecker (generally occurs around age 100).

MAXIMUM POPULATION LEVEL. The greatest number of a wildlife species that can occur if the constraints of food, cover, and water are removed; the greatest number that can exist without losses caused by social strife.

MITIGATION. Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

MIXED CONIFER. See explanation under timber type.

MONITORING AND EVALUATION. The evaluation, on a sample basis, of Forest Plan management practices to determine how well objectives are being met, as well as the effects of those management practices on the land and environment.

MOSAIC. The intermingling of plant communities and their successional stages in such a manner as to give the impression of an interwoven design.

MOUNTAIN PINE BEETLE. The common name for the bark beetle (Dendroctonous ponderosae, Hopkins) which is an insect pest that has caused more tree mortality in the intermountain west than any other.

N

NEPA PROCESS. An interdisciplinary process, mandated by the National Environmental Policy Act, which concentrates decisionmaking around issues, concerns, alternatives and the effects of alternatives on the environment.

NO ACTION ALTERNATIVE. The No Action alternative is required by regulations implementing the National Environmental Policy Act (NEPA) (40 CFR 1502.14). The no action alternative provides a baseline for estimating the effects of other alternatives. Where a project activity is being evaluated, the no action alternative is defined as one where no action or activity would take place.

NONGAME SPECIES. All wild animals not subject to sport hunting, trapping or fishing regulations.

NONSTOCKED. A stand of trees or aggregation of stands that have a stocking level below the minimum specified for meeting the prescribed management objectives.

NOXIOUS WEEDS. Rapidly spreading plants which can cause a variety of major ecological impacts to both agriculture and wild lands.

O

OLD GROWTH HABITAT. Old growth is a distinct successional stage in the development of a timber stand that has special significance for wildlife, generally characterized by: (1) large diameter trees (often exceeding 19" dbh) with a relatively dense, often multilayer canopy. (2) the presence of large, standing dead or dying trees. (3) down and dead trees, (4) stand decadence associated with the presence of various fungi and heartrots, (5) and an average age often in excess of 200 years.

OPEN FORAGE AREAS. Vegetated areas with less than 50 percent combined canopy closure of tree and tall shrub (greater than 7 feet in height).

OPEN ROAD DENSITY. A standard set in the Forest Plan that is applied to most Management Areas important to big game. This road density standard of three-quarters of a mile of open road per square mile of habitat correlates directly to the elk habitat effectiveness of the area.

OVERSTORY. The portion of trees in a forest which forms the uppermost layer of foliage.

OPTIMUM HABITAT. Amounts and arrangement of cover and forage areas that result in the greatest possible proper use of the greatest possible area by deer and elk.

OVERMATURE. The condition that exists after an even-aged stand reaches maturity and decline in vigor, health and soundness.

P

PAYMENTS TO COUNTIES. The portion of receipts derived from Forest Service resource management that is distributed to State and county governments such as the Forest Service 25 percent fund payments.

PEAK FLOW. The greatest flow attained during the melting of the winter snowpack.

PERENNIAL STREAMS. Streams that flow continuously throughout the year.

POPULATION. In statistics, the aggregate of all units forming the subject of study; otherwise, a community of individuals that share a common gene pool.

PREFERRED ALTERNATIVE. The agency's preferred alternative, one or more, that is identified in the impact statement (40 CFR 1502.14).

PRESCRIBED BURNING. The intentional application of fire to wildland fuels in either their natural or modified state under such conditions as to allow the fire to be confined to a predetermined area and at the same time to produce the intensity of heat and rate of spread required to further certain planned objectives (ie: silviculture, wildlife management, reduction of fuel hazard, etc.)

PRESCRIBED FIRE. A wildland fire burning under preplanned specified conditions to accomplish specific planned objectives. It may result from either a planned or unplanned ignition.

PRESCRIPTION. Management practices selected and scheduled for application on a designated area to attain specific goals and objectives.

PRIMARY CAVITY NESTERS. Wildlife species that excavate cavities in snags.

PROGRAMMATIC EIS. An environmental impact statement that establishes a broad management direction for an area by establishing a goal, objective, standard, management prescription and monitoring and evaluation requirement for different types of activities which are permitted. It also can establish what activities are not permitted within the specific area(s). This document does not mandate or authorize the permitted activities to proceed.

PROJECT FILE. An assemblage of documents that contains all the information developed or used during an environmental analysis. This information may be summarized in an Environmental Assessment or an

Environmental Impact Statement. The project file becomes part of the administrative record for judicial review in case of legal action.

R

RANGER DISTRICT. An administrative subdivision of the Forest, supervised by a District Ranger who reports to the Forest Supervisor.

RECORD OF DECISION. A concise public document disclosing the decision made following preparation of an EIS and the rationale used by the deciding officer to reach that decision.

REFORESTATION. The natural or artificial restocking of an area with forest trees. It may include tree planting and seeding measures to obtain natural regeneration.

REGENERATION. The renewal of a tree crop, whether by natural or artificial means. This term may also refer to the crop (seedlings, saplings) itself.

REGENERATION HARVEST. Used in reference to clearcut, seedtree and shelterwood harvest methods which remove an existing stand to prepare a site for regeneration.

RIPARIAN AREAS/HABITATS. Land areas where the vegetation and microclimate are influenced by perennial and/or intermittent water.

ROTATION. The planned number of years required to establish (including the regeneration period) and grow timber crops to a specified condition or maturity for regeneration harvest.

RESTRICTED ROAD. A National Forest road or segment which is restricted from a certain type of use or all uses during certain seasons of the year or yearlong. The use being restricted and the time period must be specified. The closure is legal when the Forest Supervisor has issued an Order and posted that Order in accordance with 36 CFR 261.

ROAD MAINTENANCE. The upkeep of the entire Forest Development Transportation Facility including surface and shoulders, parking and side areas, structures, and such traffic-control devices as are necessary for its safe and efficient utilization.

S

SALVAGE HARVEST. The cutting of trees that are dead, dying, or deteriorating before they lose commercial value as sawtimber. The removed trees are generally overmature, damaged by fire, wind, insects, fungi or other injurious agencies.

SCOPING. The procedures by which the Forest Service determines the extent of analysis necessary for a proposed action, i.e., the range of actions, alternatives, and impacts to be addressed, identification of significant issues related to a proposed action, and establishing the depth of environmental analysis, data, and task assignments needed.

SECONDARY CAVITY NESTER. Wildlife that occupies a cavity in a snag that was excavated by another species.

SEDIMENT. Any material carried in suspension by water, which will ultimately settle to the bottom. Sediment has two main sources: from the channel area itself and from disturbed sites.

SEED TREE. A tree selected as a natural seed source within a shelterwood or seedtree harvest cut; sometimes also reserved for seed collection.

SEEDTREE HARVEST. A regeneration method under an even-aged silvicultural system. A portion of the mature stand, usually 10-15 trees/acre, is retained as a source of seed for regeneration of the stand.

SEEDLINGS AND SAPLINGS. Non-commercial-size young trees, generally occurring in plantations.

SELECTION HARVEST. The periodic removal of trees, usually at 10-20 year intervals, individually or in small groups, from an uneven-aged forest in order to realize yield and establish regeneration of irregular constitution.

SENSITIVE SPECIES. Those species identified by the Regional Forester for which population viability is a concern as evidenced by significant current or predicted downward trends in (a) population numbers or density, or (b) habitat capability that would reduce a species' existing distribution.

SERAL STAGE. A transitory or developmental stage of a biotic community in an ecological succession (does not include climax successional stage or pioneer stage).

SHADE-INTOLERANT PLANTS. Plants species that do not germinate or grow well in shade.

SHADE-TOLERANT PLANTS. Plants that grow well in shade.

SHELTERWOOD HARVEST. A regeneration method under an even-aged silvicultural system. A portion of the mature stand is retained as a source of seed and protection during the regeneration period.

SHRUB. A plant with persistent woody stems and relatively low growth form; usually produces several basal shoots as opposed to a single bole; differs from a tree by its low stature and nonarborescent form.

SIGNIFICANT. As used in NEPA, requires consideration of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole, and the affected region, interests, and locality. Intensity refers to the severity of impacts (40 CFR 1508.27).

SILVICULTURE. The art and science of growing and tending forest vegetation, i.e., controlling the establishment, composition, and growth of forests, for specific management goals.

SILVICULTURAL SYSTEM. A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according to the method of carrying out the cuttings that remove the mature crop and provide for regeneration, and according to the type of forest thereby produced.

SITE PREPARATION. A general term for a variety of activities that remove or treat competing vegetation, slash, and other debris that may inhibit the establishment of regeneration.

SLASH. The residue left on the ground after felling and other silvicultural operations and/or accumulating there as a result of storm, fire, girdling, or poisoning of trees.

SLASH BURNING. The treatment or burning of slash so as to reduce fire or insect hazards.

SNAG. A standing dead tree usually without merchantable value for timber products, but may have characteristics of benefit to some cavity nesting wildlife species.

SNAG DEPENDENT WILDIFE. Wildlife species that are dependent on snags for nesting or roosting habitat or for food.

SPECIES. A unit of classification of plants and animals consisting of the largest and most inclusive array of sexually reproducing and cross-fertilizing individuals which share a common gene pool.

SPECIFIED ROAD. A Forest System Road, including related transportation facilities and appurtenances, shown on a Timber Sale Area Map and listed in Table A9 of the Timber Sale Contract.

STAND. A community of trees or other vegetation uniform in composition, constitution, spatial arrangement, or condition to be distinguishable from adjacent communities.

STAND CONVERSIONS. Application of silvicultural practices that change the species composition of trees in a stand, including planting a variety of species, discrimination against undesirable species during thinning, and other practices that naturally discriminate against undesirable species, such as; specific site preparation and harvest methods.

STANDARD. A particular action, level of performance, or threshold specified by the Forest Plan for resource protection or accomplishment of management objectives. Unlike "guidelines" which are optional, standards specified in the Forest Plan are mandatory.

STOCKING. The degree to which trees occupy the land, measured by basal area and/or number of trees by size and spacing, compared with a stocking standard; that is, the basal area and/or number of trees required to fully utilize the land's growth potential.

STREAM ORDER. It is often convenient to classify streams within a drainage basin by systematically defining the network of branches. Each nonbranching channel segment (smallest size) is designated a first-order stream. A stream which receives only first-order segments is termed a second-order stream, and so on. The order of a particular drainage basin is determined by the order of the principle or largest segment.

SUCCESSION. The changes in vegetation and in animal life that take place as the plant community evolves from bare ground to climax.

SUCCESSIONAL STAGE. A stage or recognizable condition of a plant community which occurs during its development from bare ground to climax.

SUMMER RANGE. A range, usually at higher elevation, used by deer and elk during the summer; a summer range is usually much more extensive than a winter range.

SUITABLE FOREST LAND. Forest land (as defined in CFR 219.3, 219.14) for which technology is available that will insure timber production without irreversible resource damage to soils, productivity, or watershed conditions; for which there is reasonable assurance that such lands can be adequately restocked (as provided in CFR 219.4); and for which there is management direction that indicates that timber production is an appropriate use of that area.

T

THERMAL COVER. Vegetation used by animals to modify the adverse effects of weather. A forest stand that is at least 40 feet in height with tree canopy cover of at least 70 percent provides thermal cover. These stand conditions are achieved in closed sapling-pole stands and by all older stands unless the canopy cover is reduced below 70 percent. Deciduous stands may serve as thermal cover in summer, but not in winter.

THREATENED SPECIES. Any species of plant or animal which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

TIERING. The use of a previously written environmental document with a broad scope to cover discussion of issues common to both.

TIMBER TYPES. A descriptive classification of forestland based on present occupancy of an area by tree species (ie: lodgepole, mixed conifer). More appropriately called forest cover types, this category is further defined by the composition of its vegetation and/or environmental factors that influence its locality. See Appendix A (Silvicultural Prescriptions) for more information.

U

UNACCEPTABLE MODIFICATION. Management activities which are excessive in size, scale, overall extent, and/or which are visually unrelated to the characteristic landscape in form, line, texture or color.

UNDERSTORY. Vegetation (trees or shrubs) growing under the canopy formed by taller trees.

UNEVEN-AGE MANAGEMENT. The application of a combination of actions needed to simultaneously maintain continuous high-forest cover. Cutting methods that develop and maintain uneven-aged stands are individual-tree and group selection.

UNSUITABLE FOREST LAND. Lands not selected for timber production during the development of the Forest Plan due to: (1) the multiple-use objectives for the alternative preclude timber production, (2) other management objectives for the alternative limit timber production activities to the point where management requirements set forth in 36 CFR 219.27 cannot be met, and (3) the lands are not cost-efficient over the planning horizon in meeting forest objectives that include timber production. Land not appropriate for timber production shall be designated as unsuitable in the Forest Plan.

V

VERTICAL DIVERSITY. The diversity in an area that results from the complexity of the above ground structure of the vegetation; the more tiers of vegetation or the more diverse the species makeup is, the higher the degree of vertical diversity

VIABLE POPULATION. A wildlife population of sufficient size to maintain its existence over time in spite of normal fluctuations in population levels.

VISUAL MANAGEMENT SYSTEM. The framework for inventorying the visual resource and describing measurable standards for managing for scenic values on National Forest Lands.

VISUAL QUALITY OBJECTIVE (VQO). A system of indicating the potential expectations of the visual resource by considering the frequency an area is viewed and the type of landscape.

VISUAL RESOURCE. The composite of landforms, water features, vegetative patterns and cultural features which create the visual environment.

W

WATER YIELD. The measured output of the Forest's streams.

WILDFIRE. Any wildfire not designated and managed as a prescribed fire with an approved prescription.

WILDLIFE DIVERSITY. The relative degree of abundance of wildlife species, plant species, communities, habitats or habitat features per unit area.

WINDTHROW. The action of wind uprooting trees.

WINTER RANGE. A range, usually at lower elevation, used by migratory deer and elk during the winter months; usually better defined and smaller than summer ranges.

Y

YARDING. A method of bringing logs in to a roadside area or landing, for truck transport. Methods may include forms of skyline cable logging systems, ground-based skidding, balloon, helicopter, etc.

APPENDIX

APPENDIX A

ROAD MANAGEMENT

I. ROAD MANAGEMENT

This section of the appendix outlines assumptions or guidelines that will be used for managing the road system within the Wagner/Atlanta Implementation Area. Prior to developing alternatives assumptions regarding roads were devolped. It was determined that there would be no new net increase in miles of road that are open; however the system or roads may be "re-arranged"; roads that provide public access to the Forest boundary would not be closed.

Closure of roads will be accomplished with treatments that will recontour the road or use a mixture of slash, debris, earthen barriers, short sections of recontouring, and re-vegetation (S/D/EB/R). Where the S/D/EB/R method was selected, it was done to leave portions of the road prism in place for use again sometime in the future. This is done to avoid the costs and environmental impacts of constructing, recontouring, and then constructing new again. In many cases, the objectives noted below can be met without fully recontouring the road; that is where the S/D/EB/R treatments are noted.

Post Project Objectives for New Roads:

Not add to exising open road densities by leaving these road corridors in a condition that prevents motor vehicle use and also does not serve as a travel corridor for hikers, horeback riders, or mountain bikers, i.e. travel in the area would be similar to what was present prior to road construction.

Minimize the introduction and spread of noxious weeds.

Help provide for wildlife habitat protection by reducing disturbance.

Minimize soil erosion and provide for a healthy watershed.

Reduce/elimninate road maintenance costs; this type of work would not be required for the roads treated by S/D/EB/R or recontouring.

A. EXISTING ROADS

The existing road system will need to be modified to some extent for all of the alternatives except for Alternative B. Some of the existing roads can be used to access vegetative manipulation areas in their present condition with only maintenance work required. Other existing roads will need reconstruction work before they can safely be used to access the treatment areas. This work will consist of the following elements: brush clearing to improve sight distance, installation of drainage structures such as drive-through dips or cross-drain culverts, blading to restore road surface drainage, adding turnouts to allow safe passage of two vehicles, and reestablishing the road template where necessary. Some of the roads to be reconstructed will need only one or two of these elements, while others may require all of the elements listed above. Estimated cost for this work is $4,000 per mile. All of the reconstructed roads will remain in their present level of service.

B. NEW ROAD CONSTRUCTION

Some new roads will need to be constructed to access treatment areas and for hauling timber. These roads would be single-lane local roads, built to the minimum standard needed to fulfill the road's objective safely and efficiently. None of the new roads will remain open for public travel, except for short-term use such as fuelwood gathering. Before closure culverts would be pulled and the road made to be self-maintaining. The road surface would be scarified and seeded with grass. All of these roads would be closed by a combination of earthen barriers and placing debris and slash on the roadway. The timing of the closure will depend on the area and the post treatment method for the area accessed by the road. The estimated cost of these new roads is $25,000 per mile. Temporary road closures, such as gates or barriers, may be used on some of the new roads before they are recontoured.

Some of the alternatives propose using temporary roads to access the vegetative treatment areas. These temporary roads would be built to a low standard and are intended for short-term use. Emphasis on these roads will be to build, close, and re-vegetate these roads within one season where ever possible. All of these roads would be physically closed and re-vegetated after use. The estimated cost for these roads is normally 1/2 to 2/3 of the costs noted in the preceeding paragraph. These costs include the post-use treatment.

C. MANAGEMENT AND MAINTENANCE OF ALL ROADS

- when a road is closed after slash piling is completed, the road would be closed within 1-12 months after log removal has occurred.
- when a road is closed after burning is accomplished, the road would be closed within 3 years or less of the last logs being hauled.
- when a road is closed after tree planting, the road would be closed within 4 years or less of the last logs being hauled.
- when existing roads are closed, all drainage problems would be corrected as a part of closure and rehabilitation efforts.
- where (S/D/EB/R) treatment is presribed, the road beds would be ripped prior to grass seeding.
- where recontouring is recommended, topsoil would be saved to be spread back over the surface of the recontoured area.
- opportunities to allow public firewood removal would be considered and made available prior to recontouring and S/D/EB/R treatments where ever possible.
- temporary road closures (gates, earthen barriers) would be considered to restrict access until more permanent closures have been completed, where recontour or S/D/EB/R treatments are prescribed, but will not be implemented until after burning or tree planting.
- a native grass mix would be used for all re-seeding efforts with all recontouring and S/D/EB/R treatments.

D. CLOSURES COMMON TO ALL TIMBER HARVEST ALTERNATIVES, EXCEPT ALTERNATIVE A

- Ridge Road From Whites Pass to Avalanche Butte is closed to motorized vehicles from 9/1 to 12/1.

II. ROAD MANAGEMENT BY ALTERNATIVE

Note: Maps of 2.64" to the mile scale are in the project file for the alternatives and the roads and road treatments noted below are shown on those maps. There is a separate map for each action alternative.

A. ALTERNATIVE A:

1. New Roads

All new roads proposed in this alternative would be temporary roads that would be recontoured after use. Approximately 17 miles of temporary roads would be built with this alternative. Temporary road closures, such as gates or barriers, may be used on some of the new roads before they are recontoured. Specifically the following activities will occur:

- Roads to unit A39- leave bottom road open from Wagner to Crystal Springs, recontour from Crystal Springs back. recontour road into top of unit. recontour both roads upon completion of piling.

- Road to unit A51- recontour and close as soon as slash is piled.

- Road to unit A9- recontour and close after broadcast burning.

- Road to unit A1- recontour and close after slash piling is completed.

2. Existing Roads

The following closures are year-long. Implementation would require reconstruction of approximately 10 miles of existing road. These roads are shown on the Alternative A map. Use on other existing roads in the Implementation Area will not change. Specifically the following activities will occur:

- In the Atlanta/Thomas Creek areas, recontour/re-vegetate approximately 2.0 miles of primitive roads.

Approximately 2.0 miles of existing road will be closed on a year-round basis.

B. ALTERNATIVE B:

1. New Roads

No new roads would be built in this alternative.

2. Existing Roads

All of the existing roads in the Implementation Area will remain in their current condition. These roads would be open or closed to motorized vehicle use as stated in the Helena National Forest Travel Management Plan.

C. ALTERNATIVE C:

1. New Roads

Approximately 9 miles of new road would be built in this alternative to access vegetative treatment areas. Some of these roads would be temporary roads that would be recontoured after use, and some will have the S/D/EB/R treatment leaving the road prism in place. Specifically the following activities will occur:

- Lambing/Camp to unit C-18- S/D/EB/R after burning and to C-11 recontour after slash piling.

- Benton Gulch to unit C-7- S/D/EB/R after burning is completed.

- Atlanta Creek to unit C-1- recontour/re-vegetate after piling is completed.

2. Existing Roads

Implementation would require approximately 7 miles of road reconstruction. Several existing roads would be closed to use by recontouring or by barriers in this alternative. About 21 miles of existing road would be closed to all motorized use on a year long basis. The roads to be closed are shown on the Alternative C map. These road closures would reduce motorized access in the Long Gulch, Ohio and Kentucky Gulches, and Atlanta/ Mule Creek areas. All road closures will be year-round. Specifically the following activities would occur:

- Beaver Creek- make road impassable from unit C-20 to private land in Beaver Creek, 0.5 miles closed.

- Long Gulch- recontour/revegetate the north slopes and mix with S/D/EB/R on other portions of the roads (close off area to vehicle use, no additional entry for 50+ years). This would be accomplished after slash has been piled or otherwise mechanically treated, i.e. the purchaser would do this as they move out of the area. 8.0 miles closed.

- Ohio/Kentucky Gulch areas- in Ohio, allow 1 mile of access up from Benton, make ridgetop roads undriveable and revegetate them (do this after burning is completed). 7.0 miles closed.

- Atlanta/Mule areas- recontour and revegetate all primitive roads (combination trail and road) south of Atlanta Creek, including Camas Ridge. Between Atlanta and Mule S/D/EB/R all existing troads east of system road. 5.5 miles closed (this includes 1.5 miles at the end of the Atlanta Creek road #575).

Approximately 21.0 miles of existing road will be closed on a year-long basis.

D. ALTERNATIVE D:

1. New Roads

Approximately 26 miles of new road would be built in this alternative. All of these roads would be treated using the S/D/EB/R treatments. Specifically the following activities would occur:

- Beaver Creek- units D-31 (after burning), D-32 (after slash piling), D-35 (after slash piling), D-42 (after burning), all of the roads use S/D/EB/R. D-41 recontour/slash after piling.

- Green Gulch- units D-33, 34, 36-38 use S/D/EB/R after burning.

- Ohio Gulch- units D-13-18 use S/D/EB/R after tree planting, except unit D-15 right after piling.

- Slough Creek- units D-11 recontour after piling and units D- 8-10 use S/D/EB/R after piling.

- Atlanta- all new roads S/D/EB/R and after burning except unit D-1 would be after piling.

2. Existing Roads

Implementation would require approximately 16 miles of reconstruction. Some existing roads would be closed to use in this alternative by recontouring or by barriers. The road closures are shown on the Alternative D map. These road closures would limit motorized access in the Long Gulch and Ohio Gulch areas. Specifically the following activities would occur:

- Long Gulch- no intention of creating/allowing a loop road between Rocker Creek and Long Gulch, section 23, 24 in Beaver Creek. Long Gulch road below main road to be gated/closed yearlong and build earthen barriers along lower portion of road near private land to prevent accessing the road from private. This would be accomplished after burning has been completed. 3.0 miles closed.

- Ohio Gulch- allow 1 mile of access from Benton, same as Alternative A. 2.0 miles closed.

- Head of Beaver Creek- existing roads, recontour near temporary and ridge roads by unit D-32 in section 25, 0.5 miles closed.

- Ohio Gulch- prevent connection of ridge road to Ohio Gulch road near units D-13-15. recontour/ earthen barrier existing road in south 1/2 of section 9. maintains existing access, no miles closed.

Approximately 5.5 miles of existing road would be closed on a year-long basis.

E. ALTERNATIVE E:

1. New Roads

Approximately 15 miles of new roads would be built with this alternative. All of these roads would be temporary, except for some of the roads in the Slough Creek area. The Alternative E map shows the location of these new roads. Specifically the following activities will occur:

- Long Gulch- recontour/re-vegetate all new roads after burning.

- Ridge west of Ohio- roads to units E7-10, recontour and close after burning is completed.

- Road to unit E11- recontour immediately after slashing.

- Beaver Creek- unit E-32 recontour after slash piling. Use a series of earthen barriers to close E-31 after slash piling.

- Slough Creek- Roads to units E2-3 S/D/EB/R after piling. Roads to units E5-6 recontour after burning.

2. Existing Roads

Implementation will include approximately 15 miles of reconstruction. All roads in the Long Gulch area would be recontoured, eliminating motorized access to the public land in that area. Motorized access would be limited to the northern portion of Ohio Gulch. The permanent road closures of existing roads would total about 21 miles. The Alternative E map shows these road closures. Specifically the following activities will occur:

- Long Gulch- all roads a combination of recontour and S/D/EB/R. road not needed for 50+ years and want the area back in vegetative production without access routes for vehicles. This would be accomplished after burning is completed. 8 miles closed

- Ohio Gulch- provide 1 mile of access from Benton, then treat same as in Alternative A. 2.0 miles closed.

- Atlanta Creek south of system roads- close with earthen barriers and rip/grass seed. On primitive roads close using a combination of recontour and S/D/EB/R. 4.5 miles closed.

Approximately 14.5 miles of existing road will be closed on a year-round basis.

F. ALTERNATIVE F:

1. New Roads

No new roads would be constructed with this alternative.

2. Existing Roads

Implementation will require approximately 9 miles of reconstruction. The lower raod in the Long Gulch area would be closed with barriers, reducing motorized access in this area. Motorized access would be limited to the northern portion of Ohio Gulch. Four-wheel drive roads in the Thomas Gulch, Kentucky Gulch, and Atlanta Creek areas would be closed to use by barriers or recontouring. About 14 miles of existing roads would be permanently closed in this alternative. The Alternative F map shows these road closures. Specifically the following activities will occur:

- Ohio Gulch- allow a mile of access from Benton then close with gate on bottom/earthen closure on top. This will be accomplished as soon after the timber sale contract has been awarded. 2.0 miles closed.

- East of Ohio Gulch- reduce access by closing revegetating approximately 4 miles of roads on ridges/saddles, use combination of recontour/S/D/EB/R. These roads would be closed after all burning has been completed. 4.0 miles closed.

- Atlanta Creek- same Troad treatment as Alternative E. 4.5 miles closed.

Thomas Gulch, 0.5 miles closed.

Long Gulch, the system road below the main road would be clsoed, 3.0 miles of road.

Approximately 14 miles of existing road would be closed on a year-round basis.

5/5/95

APPENDIX B

BEST MANAGEMENT PRACTICES

INTRODUCTION

Best Management Practices are the primary mechanism to enable the achievement of water quality standards (*Environmental Protection Agency 1987*). This Appendix describes the Forest Service's BMP process in detail; lists the key Soil and Water Conservation Practices (SWCP) that have been selected to be used on the Helena; and describes each SWCP that will be refined for site-specific conditions in order to arrive at the project level BMPs that protect beneficial uses and meet water quality objectives.

BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters (40 CFR 130.2, EPA Water Quality Standards Regulation). Usually BMPs are applied as a system of practices rather than a single practice. BMPs are selected on the basis of site specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

The Helena National Forest Plan states that "Soil and water conservation practices as outlined in the Soil and Water Conservation Practices Handbook (FSH 2509.22, May 1988) will be incorporated into all land use and project plans as a principal mechanism for controlling nonpoint pollution sources; meeting soil, State water quality standards, and other resource goals (HNF FP II/25) A project which causes excessive water pollution, undesirable water yield, soil erosion, or site deterioration will be corrected where feasible, or the project will be re-evaluated or terminated. Montana State Water Quality Standards require the use of Reasonable Land, Soil, and Water Conservation Practices (analogous to BMPs) as the controlling mechanism for nonpoint pollution. Use of BMPs is also required in the MOU between the Forest Service and the State of Montana as part of our responsibility as the Designated Water Quality Management Agency on National Forest System (NFS) lands.

The Practices described herein are tiered to the practices in FSH 2509.22. They were developed as part of the NEPA process, with interdisciplinary involvement, and meet Forest and State water quality objectives.

BMP IMPLEMENTATION PROCESS

In cooperation with the State, the USDA Forest Service's primary strategy for the control of nonpoint sources is based on the implementation of preventive practices (BMPs) determined necessary for the protection of the identified beneficial uses.

The Forest Service Nonpoint Source Management System consists of:

1. BMP selection and design based on site-specific conditions; technical, economic and institutional feasibility; and the designated beneficial uses of the streams.

2. BMP Application.

3. BMP monitoring to ensure that they are being implemented and are effective in protecting designated beneficial uses.

4. Evaluation of BMP monitoring results from "steps" 3 and 4.

5. Feeding back the results into current/future activities and BMP design.

The District Ranger is responsible for insuring that this BMP feedback loop is implemented on all projects.

A. BMP Selection and Design. Water quality goals are identified in Forest Plans. These goals meet or exceed applicable legal requirements, including State water quality regulations, the Clean Water Act, and the National Forest Management Act. Environmental assessments for projects are tiered to Forest Plans, using the NEPA process.

Appropriate BMPs are selected for each project by an interdisciplinary team. Each time BMPs are applied to a new location, there is flexibility to design different BMPs depending on the local conditions and values, and the downstream beneficial uses of water.

BMP selection and design are dictated by water quality objectives, soils, topography, geology, vegetation, and climate. Environmental impacts and water quality protection options are evaluated and alternative mixes of practices are considered. A final collection of practices are selected that not only protect water quality but meet other resource needs. These final selected practices constitute the BMPs.

B. BMP Application. The BMPs are translated into contract clauses, special use permit requirements, project plan specifications, and so forth. This ensures that the operator or person responsible for applying the BMP actually is required to apply it. The site-specific BMP prescriptions are taken from plan-to-ground by a combination of project layout and resource specialists (hydrology, fisheries, soil, geology, etc.). This is when final adjustments to fit the BMP prescriptions to the site are made before implementing the resource activity.

C. BMP Monitoring. When the resource activity (ex., timber harvest or road construction) begins, timber sale administrators, engineering representatives, resource specialists, and others ensure that the BMPs are implemented according to plan. BMP implementation monitoring is done before, during, and after resource activity implementation. This monitoring answers the question: Did we do what we said we were going to do? Once BMPs have been implemented, further monitoring is done to evaluate if BMPs are effective in meeting management objectives and protecting beneficial uses of water. This will be accomplished through BMP reviews. Water quality monitoring has taken place on Atlanta Creek within the analysis area. Sampling is also being conducted on streams with similar landtypes, management activities, and BMP's outside the analysis area. This Forest wide monitoring will aid in determining the effectivness of BMP's.

The natural variability of water quality under unmanaged conditions is an important factor that is considered during monitoring and evaluation. Determining the natural variability will be accomplished by design, sampling, and laboratory analyses.

D. BMP Monitoring Evaluation. The technical evaluation/monitoring described above will determine how effectively BMPs protect and/or improve water quality. Water quality standards and conditions of the beneficial uses of water will serve as one evaluation criteria. If the evaluation indicates that water quality standards are not being met and/or beneficial uses are not being protected, corrective action will consider the following three components:

1. The BMP: Is it technically sound? Is it really best, or is there a better practice which is technically sound and feasible to implement?

2. The implementation program or processes: Was the BMP applied entirely as designed? Was it only partially implemented? Were personnel, equipment, funds, or training lacking with a result of inadequate or incomplete implementation?

3. The State water quality criteria: Do the parameters and criteria that constitute water quality standards adequately reflect human induced changes to water quality and beneficial uses?

E. Feedback. Feedback of the results of BMP evaluation is both short- and long-term in nature. Where corrective action is needed, immediate response will be undertaken. This action may include: modification of the BMP, modification of the activity, ceasing the activity or possibly modification of the State water quality standard. Cumulative effects over the long-term may also lead to the need for possible corrective actions.

FORMAT OF THE BMPs

Title: Includes the sequential number of the SWCP and a brief title

Objective: Describes the SWCP objective(s) and the desired results for protecting water quality.

Effectiveness: Provides a qualitative assessment of expected effectiveness that the applied measure will have on preventing or reducing impacts on water quality. The SWCP effectiveness rating is based on literature & research, administrative studies, and professional experience. The SWCP is rated either High, Moderate, or Low based on the following criteria:

1. Literature/Research (must be applicable to area)
2. Administrative studies (local or within similar ecosystem)
3. Experience (judgment of an expert by education and/or experience)
4. Fact (obvious by reasoned [logical] response)

Implementation: This section identifies: 1) the range of site-specific water quality protection measures to be implemented and 2) how the practices are expected to be applied.

ITEMS COMMON TO ALL SOIL AND WATER CONSERVATION PRACTICES

Responsibility for Implementation: The District Ranger is responsible for insuring that the factors identified in the following SWCPs are incorporated into the Timber Sale Contracts through inclusion of proper B and/or C provisions.

Unless otherwise specified, the Presale Forester is responsible for insuring that the factors identified in the following SWCPs are incorporated into Timber Sale Contracts through inclusion of proper B and/or C provisions.

The Sale Administrator is responsible for insuring that the provisions are properly administered on the ground.

Monitoring: Unless otherwise noted, all of the SWCPs will be monitored by the TSA as part of BMP Implementation Monitoring of timber sale activities.

CLASS * SOIL AND WATER CONSERVATION PRACTICE (FSH 2509.22)

	11 - WATERSHED MANAGEMENT	
A	11.01	Determination of Cumulative Watershed Effects
A	11.02	Soil and Water Resource Monitoring and Evaluation
A	11.05	Wetlands Analysis and Evaluation
A	11.07	Oil and Hazardous Substance Spill Contingency Planning
A	11.09	Management by Closure to Use

	13	**VEGETATION MANIPULATION**
G	13.02	Slope Limitations for Tractor Operation
G	13.03	Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows
E	13.04	Revegetation of Surface Disturbed Areas
E	13.05	Soil Protection During and After Slash Windrowing
E	13.06	Soil Moisture Limitations for Tractor Operation
	14	**TIMBER**
A	14.02	Timber Harvest Unit Design
A	14.03	Use of Sale Area Maps for Designating Soil and Water Protection Needs
A	14.04	Limiting the Operating Period of Timber Sale Activities
A	14.05	Protection of Unstable Areas
A	14.06	Riparian Area Designation
E	14.08	Tractor Skidding Design
E	14.09	Suspended Log Yarding in Timber Harvesting
A	14.10	Log Landing Location and Design
E	14.11	Log Landing Erosion Prevention and Control
E	14.12	Erosion Prevention and Control Measures During Timber Sale Operations
E	14.13	Special Erosion Prevention Measures on Area Disturbed by Harvest Activities
E	14.14	Revegetation of Areas Distrubed by Harvest Activities
E	14.15	Erosion Control on Skid Trails
A	14.16	Meadow Protection During Timber Harvesting
S	14.17	Streamcourse Protection (Implementation and Enforcement)
E	14.18	Erosion Control Structure Maintenance
A	14.19	Acceptance of Timber Sale Erosion Control Measures Before Sale Closure
E	14.20	Slash Treatment in Sensitive Areas
A	14.22	Modification of the Timber Sale Contract
A	14.23	Reforestation Requirement
	15	**ROADS AND TRAILS**
A	15.01	General Guidelines for Transportation Planning
A	15.02	General Guidelines for the Location and Design of Roads and Trails
E	15.03	Road and Trail Erosion Control Plan
A	15.04	Timing of Construction Activities
E	15.05	Slope Stabilization and Prevention of Mass Failures
E	15.06	Mitigation of Surface Erosion and Stabilization of Slopes
E	15.07	Control of Permanent Road Drainage
E	15.08	Pioneer Road Construction
E	15.09	Timely Erosion Control Measures on Incomplete Road and Streamcrossing Projects
E	15.10	Control of Road Construction Excavation and Sidecast Material
W	15.11	Servicing and Refueling of Equipment
S	15.12	Control of Construction in Riparian Areas
S	15.13	Controlling In-Channel Excavation
S	15.14	Diversion of Flows Around Construction Sites
S	15.15	Streamcrossings on Temporary Roads
S	15.16	Bridge and Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)
E	15.18	Disposal of Right-of-Way and Roadside Debris
S	15.19	Streambank Protection
E	15.21	Maintenance of Roads
E	15.22	Road Surface Treatment to Prevent Loss of Materials
E	15.23	Traffic Control During Wet Periods

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* *CLASSES OF SWCP (BMP)*

A = Administrative
G = Ground Disturbance Reduction
E = Erosion Reduction
S = Stream Channel Protection/Stream Sediment Reduction
W = Water Quality Protection

PRACTICE 11.01 - Determination of Cumulative Watershed Effects

OBJECTIVE: To insure that impacts from individual actions do not cause cumulative effects in the larger area.

EFFECTIVENESS: Not applicable for this SWCP.

IMPLEMENTATION A watershed cumulative effects analysis was completed as part of the Wagner-Atlanta Analysis. Application of the HNF Water Yield Guidelines (ECA procedure), the R1/R4 sediment model adapted for the Helena, integrated with inherent site characteristics and similarity levels for each riparian aggregate was the basis of this analysis. Sales will be delayed or postponed in watersheds where water yield or sediment are increased beyond acceptable limits.

PRACTICE 11.02 - Soil and Water Resource Monitoring and Evaluation

OBJECTIVE: To determine effects of land management activities on beneficial water uses; to monitor baseline watershed conditions for comparison with State standards, Forest Plan standards, and estimation of long-term trends; to ensure the health and safety of water users; to evaluate SWCPs effectiveness; and to determine the adequacy of data, assumptions, and coefficients in the Forest Plans.

EFFECTIVENESS: Not applicable for this SWCP.

IMPLEMENTATION A Monitoring Plan for water quality station HE 105 - Atlanta Creek has been developed and is being implemented. Similar stream types undergoing similar managment activities in other areas are also being monitored. Monitoring of these streams enables us to assess the effectiveness of best management practices being implemented.

PRACTICE 11.05 - Wetlands Analysis and Evaluation; PRACTICE: 13.03 - Tractor Operation Excluded from Wetlands, Bogs, and Wet Meadows; and PRACTICE 14.16 - Meadow Protection During Timber Harvesting

OBJECTIVE: To maintain wetland functions and avoid adverse soil and water resource impacts associated with the destruction or modification of wetlands, bogs and wet meadows.

EFFECTIVENESS: High

IMPLEMENTATION This is covered by standard TSC Provision B6.61 (Meadow Protection) which is a standard provision in all contracts. When it is necessary to identify these areas on the SAM, direction to do so and protective requirements will be incorporated into C6.61 (Wetlands Protection). Vehicular or skidding equipment shall not be used on meadows except where roads, landings, and tractor roads are approved. Unless otherwise agreed, trees felled into meadows shall be removed by end-lining, and resulting logging slash shall also be removed. Damage to meadows, stream courses, and riparian Areas caused by unautho-

rized purchaser's operations shall be repaired by the purchaser in a timely manner to restore and prevent further damage.

PRACTICE 11.07 - Oil and Hazardous Substance Spill Contingency Planning

OBJECTIVE: To minimize contamination of waters from accidental spills by prior planning and development of Spill Prevention Control and Countermeasure Plans.

EFFECTIVENESS: High

IMPLEMENTATION: TSC provision C6.341 holds the purchaser responsible for taking appropriate preventive measures to insure that any spill of oil or oil products does not enter any stream or other waters of the United States. If the total oil or oil products storage exceeds 1320 gallons or if any single container exceeds a capacity of 660 gallons, the purchaser will prepare a Spill Prevention Control and Countermeasures Plan. The plan shall meet EPA requirements including certification by a registered professional engineer. If necessary, specific requirements for transporting oil to be used in conjunction with the contract will be specified in TSC provision C6.53. The location of disposal sites will be coordinated with EPA, State, and local officials responsible for safe disposal.

If a spill occurs and is from a Forest Service facility or operation, the Forest Service is the "person in charge" and is responsible for all reporting and immediate response actions, as appropriate. If the spill is from a third party operation, the Forest Service will only respond and report the spill if the third party fails to take appropriate action. The Forest Service will generally turn its incident command role over to authorized, Federal On-Scene Coordinators or other authorized State or local authorities after their arriving at the spill site, and provide support services.

PRACTICE 11.09 - Management by Closure to Use

OBJECTIVE: To exclude activities that could result in damages to facilities or degradation of soil and water resources.

EFFECTIVENESS: High

IMPLEMENTATION: Specific guidelines for closure of roads during the period of the contract and at the end of the purchasers operations will be spelled out in the TSC provision C5.51.

PRACTICE 13.04 - Revegetation of Surface Disturbed Areas

OBJECTIVE: To protect soil productivity and water quality by minimizing soil erosion.

EFFECTIVENESS: Moderate

IMPLEMENTATION: All temporary roads, landings, and skid trails will be seeded following use. Seed mixes and fertilizer specifications will be provided by the Forest Soil Scientist and incorporated into TSC provision C6.601 (Erosion Control Seeding). TSC provision C6.623 (Temporary Road, Skid Trail/Skid Road and Landing) will be included in the contract to incorporate specific requirements for scarification of skid trails and landings prior to seeding. Specified roads will be scarified no deeper than two (2) inches. This will be incorporated into TSC provision C6.601 (Erosion Control Seeding).

PRACTICE 13.05 - Soil Protection During and Following Slash Windrowing (SLASH FILTER WINDROWING)

OBJECTIVE: To reduce erosion and sedimentation from road surfaces and fill slopes, slash is windrowed below the fill slope.

EFFECTIVENESS: High

IMPLEMENTATION: At a minimum, slash filter windrows will be installed 100 feet on both sides of all new stream crossings where sediment delivery from the fill slope can be expected. Slash filter windrows will also be implemented where erosion may deliver sediment to stream systems.

PRACTICE 14.02 - Timber Harvest Unit Design, PRACTICE 14.08 - Tractor Skidding Design, and **PRACTICE 14.10 - Log Landing Location and Design**

OBJECTIVE: To insure that timber harvest unit design will secure favorable conditions of water flow and maintain water quality and soil productivity by locating/designing landings and skidding patterns to best fit the terrain and avoid soil erosion.

EFFECTIVENESS: High

IMPLEMENTATION: TSC provision C6.3 (Plan of Operation) should specify how the purchaser intends to meet erosion control requirements.

TSC provision B6.422 (Landings and Skid Trails) requires that the location of all skid trails and landings must be agreed upon before construction. Specific items that will be addressed during sale-layout and pre-work with the operator will include the following:

1. Skid Trails:

a. Design and locate skid trails and skidding operations to minimize detrimental soil disturbance.

b. Locate skid trails to avoid concentrating runoff and provide breaks in grade and waterbars.

c. Locate skid trails and landings away from natural drainage features and divert runoff to stable areas.

d. A minimum spacing of two times the average log lengths should be followed for skid trail spacing except where trails begin to merge near landings.

e. Fifthteen percent or less of the soils in a timber sale unit may be left in a severely disturbed state. The intent is to strive to create as little detrimental disturbance as possible while implementing the prescribed activities.

g. Excavated skid trails are minimized. Where required they are returned to contour and left in natural appearing state (returned to contour and topsoil replaced). They are constructed such that topsoil and subsoil materials are conserved separately.

2. Landings:

a. Landings and log decks will not be located on riparian areas in the Wagner-Atlanta Implementation Area.

b. Landings and/or burn piles will be located a minimum of 100 feet from streams and/or riparian zones, far enough away that sediment, bark, or ash and burning products will not enter. (C6.50)

PRACTICE 14.03 - Use of Sale Area Maps for Designating Soil & Water Protection Needs

OBJECTIVE: To delineate the location of protection areas and special treatment areas, to insure their recognition, proper consideration, and protection on the ground.

EFFECTIVENESS: High

IMPLEMENTATION: The following features will be designated on the SAM:

1. Streamcourses (perennial and ephemeral) to be protected under B6.5. Stands A1, A5, A7, A9, A10, A11, A27, A29, A30, A31, A35, A38, A41, A50, A51, C3, C9, C10, C11, C12, C19, C22, C24, D6, D9, D20, D21, D24, D25, D32, D26, D27, D32, D26, D27, D33, D34, D40, E5, E12, E23, E21, E25, E28, F7, F18, F14, F25, F40, F43 will have adequate SMZ's identified.

2. Wetlands and Riparian Areas (meadows, lakes, pot holes, etc.) to be protected per C6.61. Stands A1, A9, C1, C3, C5, C6, D1, D2, D4, D5, D6, D7, F1, F3, and F4 contain wet areas which must be designated for protection.

3. Special treatment areas, including riparian areas with planned harvest where logging and site preparation will differ from the remainder of the unit, will be identified in TSC provision C6.50# (Riparian Areas)

These features will be reviewed on the ground by the purchaser and the sale administrator prior to harvesting.

MONITORING: A Watershed Specialist (Forest or District) will insure that the above features have been designated on the Sale Area Map during contract development.

PRACTICE 14.04 - Limiting the Operating Period of Timber Sale Activities and

OBJECTIVE: To minimize soil erosion and sedimentation and loss in soil productivity by insuring activities, including erosion control work, road maintenance, etc., are done in a timely manner: 1) within the time period specified in the TSC; or 2) when ground conditions are such that erosion and sedimentation can be prevented.

EFFECTIVENESS: High

IMPLEMENTATION: Within the Wagner-Atlanta analysis area, the following specifications relating to operating periods have been identified and recommended by the IDT:

1. Standard TSC provision B6.31 allows operations outside the normal operating season, subject to requirements in B6.6, and B6.65. Specific requirements will be covered by adding the following wording to C6.6:

a. Draindips will be built into skidtrails and temporary roads at the time of construction, where feasible. Where draindips are not feasible, or are not functioning, trails and temporary roads will be waterbarred on a weekly basis and/or prior to any prolonged shutdown.

2. Unless otherwise agreed, the following additional requirements apply to winter operations:

a. In the event tracked or wheeled equipment yarding occurs during winter conditions, operations should be conducted over compacted snow approximately six inches or more in depth or on ground frozen to a depth of four inches or more.

Winter operations will also require that during all snowplowing activities, breaks will be maintained in the snow berm along the outside of roads, particularly in the areas of expected road drainage (C5.46).

Operations will be discontinued if conditions change and activities are no longer occurring on frozen or snow covered ground, which is the intent of winter logging.

PRACTICE 14.05 - Protection of Unstable Areas

OBJECTIVE: To protect unstable areas and to avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

EFFECTIVENESS: Moderate

IMPLEMENTATION: Where unstable areas are presently classified as suitable forest lands and harvest cannot be designed without causing irreversible effects, they are changed to the classification of unsuitable forest lands. If the interdisciplinary team determines that current or prospective logging methods would result in unacceptable watershed impact, the harvest is deferred.

PRACTICE 14.06 - Riparian Area Designation and Protection

OBJECTIVE: To minimize the adverse effects on Riparian Areas with prescriptions that manage nearby logging and related land disturbance activities.

EFFECTIVENESS: High

IMPLEMENTATION: Riparian areas will be clearly marked prior to ground disturbing activities. Riparian areas will be identified in TSC provision C6.6 as being required to be located on the SAM. Requirements for protection of these areas will also be in TSC provision C6.6. The following practices in streamside management zones will be prohibited:

1. Broadcast burning

2. The operation of wheeled or tracked vehicles will be prohibited except on established roads.

3. The forest practice of clearcutting

4. The construction of roads except when necessary to cross a stream or wetland.

5. The handling, storage, application, or disposal of hazardous or toxic materials in a manner that pollutes streams, lakes, or wetlands or that may cause damage or injury to humans, land, animals, or plants

6. The side-casting of road material into a stream, wetland, or watercourse.

7. The deposit of slash in streams or other water bodies.

8. Retention of trees in the SMZ will comply with the Montana guide to the streamside management zone law and rules.

PRACTICE 14.09 - Suspended Log Yarding in Timber Harvesting

OBJECTIVE: To protect the soil from excessive disturbance and accelterated erosion and to maintain the integrity of the Riparian Area and other sensitive watershed areas.

EFFECTIVENESS: Moderate

IMPLEMENTATION: As noted in TSC provision B1.1, item (n), areas requiring special yarding, as identified in TSC provision B6.42 (Skidding and Yarding), will be identified on the sale area map. These requirements will be included in TSC C6.4 (Conduct of Logging).

1. At a minimum leading end suspension of log turns is required for all cable yarding.

2. Leading end suspension of log turns is required for all wheeled and tracked gound based yarding equipment.

PRACTICE 14.12 - Erosion Prevention and Control Measures During Timber Sale Operations,

PRACTICE 14.11 - Log Landing Erosion Prevention and Control, and

PRACTICE 14.15 - Erosion Control on Skid Trails

OBJECTIVE: To protect water quality by minimizing erosion and subsequent sedimentation derived from log landings and skid trails.

EFFECTIVENESS: High

IMPLEMENTATION: The following criteria will be used in controlling erosion and restoring landings and skid trails so as to minimize erosion:

General:

TSC provision B6.6 requires the purchaser to conduct operations in a reasonable fashion to minimize erosion. This is a standard provision in the TSC. Additionally, specific erosion requirements will be spelled out in TSC Provisions such as C6.4, C6.6, C6.601, C6.602, C6.622, C6.623.

Skid trails and landings will be seeded with a mix specified in C6.601.

Landings:

a. During period of use, landings will be maintained in such a manner that debris and sediment are not delivered to any streams.

b. Landings will drain in a direction and manner that will minimize erosion and preclude sediment delivery to any stream.

c. Standard TSC provision B6.63 (Landings) requires that after landings have served the purchaser's purpose, the purchaser shall ditch or slope them to permit the water to drain or spread.

Skid Trails:

Skid trails will be water-barred, using the cross-drain spacing guide from the R1-R4 Guide for Controlling Sediment From Secondary Logging Roads.

PRACTICE 14.13 - Special Erosion Prevention Measures on Areas Disturbed by Harvest Activities and PRACTICE 14.14 - Revegetation of Areas Disturbed by Harvest Activities

OBJECTIVE: To establish a vegetative cover on disturbed sites in order to reduce erosion and sedimentation.

EFFECTIVENESS: Moderate

IMPLEMENTATION: Revegetation by seeding and fertilization to control erosion is planned for all temporary roads, skid trails, and landings. If erosion problems continue on these areas, or other deficiencies are discovered or are brought to the attention of the Forest Service, they will be corrected by retreatment or other control measures. If the problem cannot be resolved under the TSC, funding will be provided through other funding sources such as KV or, if necessary, appropriated funds.

PRACTICE 14.17 - **Stream Channel Protection (Implementation and Enforcement)**

OBJECTIVES: (1) To protect the natural flow of streams; (2) to provide unobstructed passage of stormflows; (3) to reduce sediment and other pollutants from entering streams; and (4) to restore the natural course of any stream as soon as practicable if the stream is diverted as a result of timber management activities.

EFFECTIVENESS: High

IMPLEMENTATION: The following items will be incorporated into the TSC via the identified B and C provisions:

1. Location and method of stream crossings will be agreed upon prior to construction (B6.422 Skid Trails and Landings).

2. Purchaser shall repair all damage to a streamcourse if the purchaser is negligent in his operations, including damage to banks and channel, to an acceptable condition as agreed to by the certified sale administrator and purchaser's representative.

3. All project debris shall be removed from streamcourse in an agreed upon manner that will cause the least disturbance (B6.5 Streamcourse Protection).

4. Wheeled or tracked equipment shall not operate within 50 feet (100 feet where SMZ law requires it) slope distance of the apparent high water mark of streamcourses designated for protection on the Sale Area Map (C6.6 Erosion Prevention and Control).

5. When ground skidding systems are employed, logs will be end-lined out of streamside and Riparian Areas. Equipment is permitted to enter streamside areas only at locations and times agreed to by the certified sale administrator and the purchaser and permitted under the Montana Streamside Management Zone Law (C6.50#, SMZ and Riparian Area Protection).

6. Material from temporary road and skid trail stream crossings will be removed and streambanks restored to an acceptable condition. (B6.62 Temporary Roads)

7. A Montana Stream Protection Act permit (SPA formerly 124) will be obtained in advance where the bed or bank of the stream will be affected.

PRACTICE 14.18 - Erosion Control Structure Maintenance

OBJECTIVE: To insure that constructed erosion control structures are stabilized and working effectively.

EFFECTIVENESS: High

IMPLEMENTATION: TSC provision B6.66 requires that during the period of the contract, the purchaser shall provide maintenance of soil erosion control structures constructed by the purchaser until they become stabilized, but not for more than one year after their construction. After 1 year, any erosion control work needed is accomplished through KV funding earmarked for that use.

TSC provision C6.6(F) requires the purchaser to maintain erosion control structures concurrently with his operations under the sale and in any case not later than 15 days after completion of skidding on each unit or subdivision.

PRACTICE 14.19 - Acceptance of Timber Sale Erosion Control Measures Before Sale Closure

OBJECTIVE: To assure the adequacy of required erosion control work on timber sales.

EFFECTIVENESS: High

IMPLEMENTATION AND RESPONSIBILITY: TSC provision B6.35 requires that upon the purchaser's written request and assurance that work has been completed the Forest Service shall perform an inspection. One area the purchaser might request acceptance for is specific requirements such as logging, slash disposal, erosion control, or snag felling. In evaluating acceptance the following definition will be used by the Forest Service: "Acceptable" erosion control means only minor deviation from established standards, provided no major or lasting impact is caused to soil and water resources. Certified TSAs will not accept as completed erosion control, measures which fail to meet this criteria.

PRACTICE 14.20 - Slash Treatment In Sensitive Areas

OBJECTIVE: To protect water quality by protecting sensitive tributary areas from degradation which would result from the use of mechanized equipment for slash disposal.

EFFECTIVENESS: Moderate

IMPLEMENTATION: All such sensitive areas, including riparian harvest areas, bogs and meadows will be identified on the sale area map, the slash treatment map, and in the contract. TSC Provision C6.50

PRACTICE 14.22 - Modification of the Timber Sale Contract

OBJECTIVE: To modify the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will cause irreversible damage to soil, water, or watershed values.

EFFECTIVENESS: High

IMPLEMENTATION: Over time, the Forest Service adopts new policies and direction that amend how we address timber harvest operations. An example is the recent change in direction to leave some large organic debris in stream channels instead of removing it all. In cases such as this, modifications to the TSC would occur under provision B2.37 (Minor Changes).

If evidence indicates that unacceptable impacts would occur to soil and water resources, when the sale was harvested as planned, the Forest Service Representative will request the Contracting Officer to gain Regional

Forester advice and approval to proceed with a resource environmental modification, mutual cancellation, or unilateral cancellation of the Timber Sale Contract as allowed by TSC Provision B8.3. If the decision is for a resource environmental modification, once the action is approved by the Regional Forester, the appropriate Line Officer will assign an interdisciplinary team to make recommendations for implementation.

PRACTICE 14.23 - Reforestation Requirement

OBJECTIVE: To promote prompt reforestation and to limit disturbance on areas with limited regeneration potential.

IMPLEMENTATION AND RESPONSIBILITY: All areas projected for regeneration harvest have been reviewed for silvicultural opportunities and have been certified that regeneration with five years is achievable. Project KV Plans will include funding for surveys as well as planting and site prep if necessary.

MONITORING: Regeneration Survey results are included in stand records.

PRACTICE 15.01 - General Guidelines for Transportation Planning

OBJECTIVE: To include soil and water resource considerations into Transportation Planning.

EFFECTIVENESS: Moderate

IMPLEMENTATION: Standard TSC provision B5.1 authorizes the purchaser to construct and maintain roads, bridges, and other transportation facilities needed for harvesting. Road construction contracts to implement the Wagner-Atlanta EIS will include provisions to meet water quality soils, and other resource protection requirements required in the EIS

PRACTICE 15.02 - General Guidelines for the Location and Design of Roads and Trails

OBJECTIVE: To locate and design roads and trails with minimal soil and water resource impact while considering all design criteria.

EFFECTIVENESS: Moderate

IMPLEMENTATION: The following items, listed and mentioned under several other Practices, nevertheless are general road location and design guidelines for minimizing impacts on water quality (FSH 7709.55, 56; Montana State BMP's):

1. Resource Specialist Review - Review available information and consult with specialists as necessary to help identify problem soil types and unstable areas, and to assist with location and design.

2. Fit the road to the topography - Use natural benches, follow contours, avoid long, steep road grades. Balance cut/fill where possible to avoid waste areas.

3. Locate on stable topography - Avoid slumps and slide-prone areas, and steep sidehills.

4. Location with respect to streams and water bodies, including wetlands - Locate roads a safe distance away from streams and other water bodies, and provide an adequate buffer zone to trap sediment before in enters into any water body. Where possible, locate turn-outs and turn-arounds at least 200 feet from water bodies or riparian zones. Where placement within 200 feet is necessary due to safety considerations, emphasize erosion control measures to protect water quality; i.e additional windrowing, seeding, etc.

5. Stream crossing sites - Minimize the number of stream crossings, and choose stable sites. Structures will be designed (sized) for long-term stability, generally for the Q50 (50- year return interval event), and will provide for fish passage if present. A SPA permit (formerly 124) will be filed with Water Quality Bureau and Department of Fish, Wildlife, and Parks for all crossings.

6. Road drainage - Locate and design roads and trails to drain naturally by appropriate use of out-sloping and in-sloping with cross drainage and grade changes, where possible. Cross drains will be installed to 1) carry intercepted flow across constructed areas; 2) to relieve the length of undrained ditch; and 3) to minimize disruption of normal drainage patterns. Road and trail drainage should be channeled to effective buffer areas, either natural or manmade, to maximize sediment deposition prior to entry into live water.

In addition, roads and trails will be designed to minimize impacts on water quality. Design criteria to accomplish this will include:

a. Ditch lines and road grades will be designed to minimize unfiltered flow into streams. A rolling dip, relief culvert or similar structure will be installed as close as practical to crossings to minimize direct sediment and/or water input directly into streams. Route the drainage through SMZ, buffer strips, or other sediment settling structures where possible.

b. At a minimum, windrows (Practice 15.10) will be installed 100 feet on both sides of crossings, and where installation will minimize sediment delivery to nearby streams or channels. Windrows will also be installed where fill slope erosion is possible, or where road derived erosion may be delivered; i.e. outflow area of culverts or rolling dips, etc. (Std. FS Spec. Section 201, Clearing and Grubbing; 05-Slash Treatment; 85 SPS 201A; 85 SPS 201).

c. The design objective of cross drainage and ditch relief culverts will be to restore intercepted flow to the natural drainage path and direction as rapidly as possible. A deliberate attempt will be made to keep the road and trail network from becoming the concentration mechanism so related to water yield and peak flow increase problems.

7. Design standards- Design to the minimum standard necessary to accomplish anticipated use and equipment needs safely, balancing long-term and short-term maintenance needs.

8. Stabilization of erodable cut and fill surfaces through revegetation- Aggressive seeding and fertilization of erodible surfaces exposed during construction will be accomplished. Out-year seeding and fertilization will be done where original treatment is not fully successful.

9. For pioneer road and trail construction- After October 1, or earlier if wet conditions are present or are expected, no more than 1000 feet of pioneer construction at a time can have incomplete erosion control work (85 SPS 204).

10. Temporary roads (including those within units) returned to contour will be constructed such that topsoil is conserved and such that additional land area does not need to be disturbed during reclamation.

PRACTICE 15.03 - Road and Trail Erosion Control Plan

OBJECTIVE: To prevent, limit, and mitigate erosion, sedimentation, and resulting water quality degradation prior to the initiation of construction and maintenance activities through effective contract administration during construction and timely implementation of erosion control practices.

EFFECTIVENESS: Moderate

IMPLEMENTATION: The following erosion control objectives and mitigation measures have been developed by the IDT and will be reflected in contract specifications and provisions. The Engineer will certify that the Contractors Erosion Control Plan meets the specifications of Std. FS Spec. Section 204:

1. Vegetation will be re-established as soon as possible on exposed cut and fill slopes. Various operating seasons on varied units and sales within the analysis area will require seeding and fertilization specs to vary. Mulching will be required on erodible slopes where difficulty in re-establishing vegetation is anticipated.

2. Prompt attention to potential erosion problems, both anticipated and un-anticipated, before they become a water quality issue, will be required. On-site stock piling of straw bales for immediate availability and erosion cloth or a suitable substitute stored off-site but available will also be required.

3. Windrows will be used on all significant fill slopes where there is a possibility of erosion or sedimentation into a nearby stream or channel (Std. FS Spec. 201).

4. Cross drains and relief culverts will be installed so as to minimize effects from the intercepted water (see also Practice 15.02 f.(3)).

5. Equipment shall not be operated when ground conditions are such that excessive ground impacts will occur unless these impacts are documented and mitigated through other Conservation Practices.

Prior to the start of construction, the Contractor shall submit a schedule for proposed erosion control work as required in the Standard Specifications. The schedule shall include all erosion control items identified in the specifications. Erosion control work to be done by the Contractor will be defined in Standard Specification 204 and/or in the Drawings. The schedule shall consider erosion control work necessary for all phases of the project. The Contractor's construction schedule and plan of operation will be reviewed in conjunction with the erosion control plan to insure their compatibility before any schedules are approved.

PRACTICE 15.05 - Slope Stabilization and Prevention of Mass Failures

OBJECTIVE: To reduce sedimentation by minimizing the chances for road-related mass failures, including landslides and embankment slumps.

EFFECTIVENESS: Moderate

IMPLEMENTATION: In areas with intrinsic slope stability problems, appropriate technical resource staffs (Geotechnical Engineers, Soil Scientists, Geologists) will be involved in an interdisciplinary approach to route location and design to meet requirements developed through the NEPA process.

PRACTICE 15.06 - Mitigation of Surface Erosion and Stabilization of Slopes.

OBJECTIVE: To minimize soil erosion from road cutslopes, fillslopes, and travelway.

EFFECTIVENESS: Moderate

IMPLEMENTATION: Areas requiring mitigation of surface erosion will occur during the life of the contracts. When these are found, the following provisions will be implemented:

1. Where surface erosion is ocurring because of inadequate vegetative cover, additional seeding and refertilization will occur using recommended seed and fertilizer mixes. A T108 spec covers reseeding of cut slopes, if bared by the purchaser's maintenance operation. If the purchaser has done his required seeding, or bare spots are not caused by the purchaser, revise the KV Plan to cover costs.

2. Where ditches are carrying erosion products into stream channels, straw bale and/or erosion cloth ditch blocks will be installed to "short-circuit" the delivery. Seeding of the eroding surfaces, and seeding of the stored sediment in the ditch will also be accomplished. If problem areas are known before contract award, add C6.602# to require cross ditching on segments of road.

3. Where straw bale/erosion cloth structures either fail or opportunity for success is doubtful, additional relief culverts will be installed to drain the ditches out onto suitable ground to at least minimize delivery of erosion products to the stream. If problem areas are known before contract award, add C6.602# to require cross ditching on segments of road.

4. Slumping of cutslopes may require a combination of both mechanical and vegetative controls. If/when this problem is found, a solution will be determined in consultation with the engineers and the soil scientist.

Unless caused by the purchaser during his maintenance operations (a.) or known before sale award (c.), or are part of a recurrent slide area (d.) these items will be beyond the scope of purchaser responsibility. Repair and/or improvement will be handled under reconstruction modified into the contract under C8.3 or KV Plan revision.

PRACTICE 15.07 - Control of Permanent Road Drainage

OBJECTIVE: To minimize the erosive effects of concentrated water and the degradation of water quality by proper design and construction of road drainage systems and drainage control structures.

EFFECTIVENESS: Moderate

IMPLEMENTATION: A. *For New Construction-* The following criteria will be incorporated into new road design:

1. Provide adequate drainage from the surface of all permanent and temporary roads through use of sloping, dips, grade changes, etc.

2. Ditch relief culverts will be designed to handle anticipated ditch flow.

3. Provide energy dissipators or downspouts where necessary at the downstream end of ditch relief culverts to reduce erosion energy of the emerging water.

At a minimum, the following items will be added to or improved in the existing road system that will be used for proposed timber haul:

1. Rock energy dissipators or downspouts will be placed below problem culvert outlets (Reconstruction Item).

2. In all areas where ditch erosion is significant at this time, relief culverts that drain onto suitable areas will be installed (Reconstruction Item).

3. Roads restricted after use will also have erosion control measures in place prior to final pull-out. (TSC B/C 6.6, B6.65)

4. For all native surface roads to be closed, the travelway will be scarified, seeded and fertilized. (TSC C6.601).

PRACTICE 15.08 - Pioneer Road Construction

OBJECTIVE: To minimize sediment production and mass wasting associated with pioneer road construction.

EFFECTIVENESS: Moderate

IMPLEMENTATION: The following contract specifications will be required:

1. Construction of pioneer roads shall be confined to the roadway limits unless otherwise approved by the Contracting Officer (Std. FS Spec. 203.11).

2. Pioneering shall be conducted so as to prevent undercutting of the designated final cut slope, and to prevent avoidable deposition of materials outside the designated roadway limits (Std. FS Spec. 203).

3. Erosion control work will be completed concurrent with construction activity or prior to the wet season. During the wet and winter season, no more than 1000 feet of road can be in the pioneer state without the required erosion control work at any time (Std. FS Spec. 204).

4. Permanent culverts will be installed during the pioneer phase unless positive control of sediment can be accomplished during installation, use, and removal of the temporary structure.

PRACTICE 15.09 - Timely Erosion Control Measures on Incomplete Roads and Streamcrossing Projects

OBJECTIVE: To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

EFFECTIVENESS: Moderate

IMPLEMENTATION: The following preventive measures will be implemented during projects:

1. The removal of temporary culverts, culvert plugs, diversion dams, or elevated streamcrossing causeways;

2. The installation of temporary culverts, side drains, flumes, cross drains, diversion ditches, energy dissipators, dips, sediment basins, berms, debris racks, or other facilities needed to control erosion;

3. The removal of debris, obstructions, and spoil material from channels and floodplains;

4. Grass seeding, planting deep rooted vegetation and/or mulching.

PRACTICE 15.10 - Control of Road Construction Excavation and Sidecast Material

OBJECTIVE: To reduce sedimentation from unconsolidated excavated and sidecast material caused by road construction, reconstruction, or maintenance, through the use of slash filter windrowing.

EFFECTIVENESS: High

IMPLEMENTATION: At a minimum, windrows will be installed 100 feet on both sides of all new stream crossings. Windrows will also be installed wherever erosion may deliver sediment to a stream system.

PRACTICE 15.11 - Servicing and Refueling of Equipment

OBJECTIVE: To prevent contamination of waters from accidental spills of fuels, lubricants, raw sewage, wash water, and other harmful materials.

EFFECTIVENESS: High

IMPLEMENTATION: The Contracting Officer, Engineer, or Sale Administrator will designate the location, size and allowable uses of service and refueling areas. They will also be aware of actions to be taken in case of a hazardous spill, as outlined in the Forest Hazardous Substance Spill Contingency Plan (B6.34; C6.341 for oil and oil products).

PRACTICE 15.12 - Control of Construction in Riparian Areas

OBJECTIVE: To minimize the adverse effects on riparian areas from Roads and Trails

EFFECTIVENESS: High

IMPLEMENTATION: Except at designated stream crossings road construction will avoid placing fill material in riparian areas. Riparian area requirements are identified during the environmental analysis by the interdisciplinary team.

PRACTICE 15.13 - Controlling In-Channel Excavation

OBJECTIVE: To minimize stream channel disturbances and related sediment production, and to make sure activities comply with the FG-124 Process as agreed upon between the Forest Service and the State of Montana.

EFFECTIVENESS: High

IMPLEMENTATION: Construction equipment may cross, operate in, or operate near streamcourses only where so designated by the Forest Service or as necessary in the construction or removal of culverts and bridges. This will be done in compliance with the specifications and mitigation required in the FG-124 Permit and included in the project specifications. The FG-124 Form will be sent to MDFWP, approved or modified, and returned prior to actual channel work.

Unless otherwise approved, no in-channel excavation shall be made outside of de-watered areas, and the natural stream bed adjacent to the structure shall not be disturbed without approval of the Engineer. If any excavation or dredging is made at the site of the structure before caissons, cribs, or cofferdams are sunk in place, all such excavations will be restored to the original ground surface or the stream bed will be protected with suitable stable material. Material from foundation or other excavation shall not be discharged directly into live streams but shall be pumped to settling areas shown on the drawings or approved by the Engineer. If the channel is damaged during construction, it should be restored as nearly as possible to its original configuration without causing additional damage to the channel. Excavations for stream crossings will conform to the SPA (124) permit criteria, including timing restrictions (as well as Std. FS Spec 206, 206A, and applicable SPS's).

PRACTICE 15.14 - Diversion of Flows Around Construction Sites

OBJECTIVE: To minimize downstream sedimentation by insuring that all stream diversions are carefully planned and executed.

EFFECTIVENESS: High

IMPLEMENTATION: Flow in streamcourses may only be diverted if the Forest Service deems it necessary for the contractor to do the job. Such a diverted flow shall be restored to the natural streamcourse as soon as practicable and, in any event, within the period stated in the SPA (124) permit. Stream channels impacted by construction activity will be restored to their natural grade, condition, and alignment. The SPA (124) permit will be filed as specified in Practice 15.13 (Std. FS Spec. 206, 206A, and applicable SPS's).

PRACTICE 15.15 - Stream Crossings on Temporary Roads

OBJECTIVE: To keep temporary roads from unduly damaging streams, disturbing channels, or obstructing fish passage.

EFFECTIVENESS: Moderate

IMPLEMENTATION: Culverts, temporary bridges, low-water crossings, or log-fords will be required on all temporary roads and crossings. Streams that will have flowing water during the life of the temporary crossing will normally use culverts or a bridge. The number of temporary crossings will kept to the minimum needed for access.

1. Temporary crossings on temporary roads will be removed when no longer needed, and any fills will be removed and the channel restored to pre-project condition (TSC B5.2, B6.5, C5.2). A SPA (124) permit will also be required.

2. Temporary crossings on system roads will be removed following use but protected fills, including constructed abutments, may remain.

3. Temporary crossings on temporary roads will only be allowed where anticipated or calculated flow is 40 CFS or less (approx. 48" CMP). Flow situations greater than this will normally not allow temporary crossings. Larger temporary crossing structures may be allowed following IDT review.

PRACTICE 15.16 - Bridge and Culvert Installation (Disposition of Surplus Material and Protection of Fisheries)

OBJECTIVE: To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

EFFECTIVENESS: High

IMPLEMENTATION: The following preventive measures will be included in contract specifications for such installations:

1. Diverting stream flow through or around project sites if needed during construction in order to minimize erosion and downstream sedimentation. Live stream culvert installations will be de-watered.

2. Erodible material shall not be deposited into live streams.

3. Any material stockpiled on floodplains shall be removed before rising waters reach the stockpiled material.

4. During excavation in or near the streamcourse, it may be necessary to use suitable coffer dams, caissions, cribs or sheet piling. This will usually be the case where groundwater is contributing a

significant amount of water to the immediate excavation area. If any of the aforementioned devices are used, they will be practically watertight and no excavation will be made immediately outside of them.

5. Water pumped from foundation excavation shall not be discharged directly into live streams, but shall be pumped into settling ponds or into locations where sediment will not re-enter water.

PRACTICE 15.18 - Disposal of Right-of-Way and Roadside Debris

OBJECTIVE: To insure that debris generated during road construction is kept out of streams and to prevent slash and debris from subsequently obstructing channels.

EFFECTIVENESS: High

IMPLEMENTATION: Construction debris and other newly generated slash developed along roads near streams shall be disposed of by the following means as applicable:

1. On-Site

a. Windrowing
b. Scattering
c. Burying
d. Chipping
e. Disposal in Cutting Units
f. Piling and Burning
g. Embankment Placement

2. Removal to agreed upon locations.

3. A combination of the above. Std. FS Spec. 210, and SPS 201.

PRACTICE 15.19 - Streambank Protection

OBJECTIVE: To minimize sediment production from streambanks and structural abutments in natural waterways.

EFFECTIVENESS: Moderate

IMPLEMENTATION: To reduce sediment and channel bank degradation at sites disturbed by construction of stream crossing or roadway fill, it may be necessary to incorporate "armoring" in the design of a structure to allow the water course to stabilize after construction. Riprap, gabion structures, and other measures are commonly used to armor stream banks and drainage ways from the erosive forces of flowing water. These measures must be sized and installed in such a way that they effectively resist erosive water velocities. Stone used for riprap should be free from weakly structured rock, soil, organic material and materials of insufficient size, all of which are not resistant to stream flow and would only serve as sediment sources. Outlets for drainage facilities in erodible soils commonly require riprapping for energy dissipation (FSH 7709.56B, and Std. FS Spec. 619).

PRACTICE 15.21 - Maintenance of Roads

OBJECTIVE: To maintain all roads in a manner which provides for soil and water resource protection by minimizing rutting, failures, sidecasting, and blockage of drainage facilities.

EFFECTIVENESS: Moderate

IMPLEMENTATION: 1. For roads in active timber sale areas standard TSC provision B5.4 (Road Maintenance) requires the purchaser to perform or pay for road maintenance work commensurate with the purchasers use. C5.4 (Road Maintenance) road maintenance is the preservation of the road facility including surface, shoulders, miscellaneous structures, drainage, sight distance, and all such traffic control devices required to insure safe and efficient use by established road users and adequately protect adjacent resources. Purchaser's maintenance responsibility shall cover the before, during, and after operation period during any year when operations and road use are performed under the terms of the timber sale contract.

Purchaser shall perform road maintenance work, commensurate with purchaser's use, on roads controlled by Forest Service and used by purchaser in connection with this sale except for those roads and/or maintenance activities which are identified for required deposits in C5.411# and C5.412#.

All maintenance work shall be done currently, as necessary, in accordance with T-specifications set forth herein or attached hereto, except for agreed adjustments (TSC C5.4- T301, 310).

2. For roads not in an active timber sale area road maintenance must still occur at sufficient frequency to protect the investment in the road as well prevent deterioration of the drainage structure function. This will be accomplished by scheduling periodic inspection and maintenance, including cleaning dips and cross drains, repairing ditches, marking culvert inlets to aid in location, and cleaning debris from ditches and culvert inlets to provide full function during peak runoff events (FSH 7709.15).

PRACTICE 15.23 - Traffic Control During Wet Periods

OBJECTIVE: To reduce the potential for road surface disturbance during wet weather and to reduce sedimentation probability.

EFFECTIVENESS: Moderate

IMPLEMENTATION: Generally, use restrictions on the paved roads control access to traffic use on the aggregate and native surfaced roads. Haul restrictions are placed on asphalt-surfaced roads, based on interpretation of thermistor data. Restrictions are placed on native and aggregate-surfaced roads when a FS representative feels that damage will occur with further use. Roads that are restricted are so indicated in Forest Supervisor Orders, posted at FS Stations and in local media.

PRACTICE 15.25 - Obliteration of Temporary Roads

OBJECTIVE: To reduce sediment generated from temporary roads by obliterating them at the completion of their intended use.

EFFECTIVENESS: High

IMPLEMENTATION: Effective obliteration is generally achieved through a combination of the following measures: (TSC B6.62, C6.62, C6.622, C6.623)

1. Road effectively drained and blocked.

2. Temporary culverts and bridges removed and any modified channel slopes stabilized and revegetated.

3. Road returned to resource production through revegetation (grass, browse, or trees).

4. Sideslopes reshaped and stabilized.

Environmental Impact Statement

USDA - Forest Service

Record of Decision

WAGNER/ATLANTA VEGETATION TREATMENT PROJECT

Helena National Forest
Townsend Ranger District
Meagher County, Montana

July 1995

I. INTRODUCTION

This Record of Decision (ROD) documents my decisions and rationale for implementation of a combination of vegetative treatments, associated road construction, mitigation measures, and monitoring in the Wagner-Atlanta Implementation Area.

My decisions are guided by the 1986 Helena National Forest Land and Resource Management Plan (Forest Plan). Specifically, the decisions are influenced by the need to move towards the desired resource conditions identified during the Big Belts Landscape Analysis and the needs and desires expressed by public and agency commentors throughout the analysis process.

The Implementation Area encompasses approximately 37,000 acres on the east side of the Big Belt Mountains on the Townsend Ranger District, Helena National Forest. The environmental analysis was conducted over the large Implementation Area to assure that management actions could be analyzed over enough area to determine effects on a landscape scale. Historically, projects have involved much smaller areas and the overall effects to all resources are less likely to be determined. This project also differs substantially from previous proposals because it suggests planned entries at 25 year intervals rather than reentering at much shorter intervals. Treating more acres per entry with longer intervals between treatments is designed to achieve needed treatments over long periods while decreasing the frequency and total duration of disturbances.

Treatments considered throughout the Implementation Area were designed to achieve, or move closer to, the desired conditions identified in the Big Belt Landscape Analysis. Basically, the desired conditions are historical conditions of species composition, density, and productivity that represent healthy and sustainable forested, grassland, and riparian ecosystems.

II. THE DECISION AND RATIONALE FOR THE DECISION

I have selected Alternative E, with several modifications, for implementation. The modifications to Alternative E include:

1) Elimination of harvest units E1, E2, E3, E4, E5, E7, E14, E26, E27, E29, E34, E45, and about three-fourths of E22.

2) Addition of harvest units C20, C26, C27 and D11 and prescribe burn units C29, C31, C41, C42, F16, F17, F18, F19, F44, F45, F46, F47, F48, F49, and F50.

3) Change the prescription of E15 from seed tree to commercial thin and change a portion of E20 and all of E23 from harvest to prescribed burning.

4) Change the harvest prescription in unit E32 from selection to seed tree and increase the proportion of the unit that is harvested.

5) Modify the treatment prescription to selective harvest on about 20 percent of unit E35.

6) Change the harvest prescription of C20 to increase the amount of seed tree harvest by 238 acres and reduce the amount of shelterwood treatment by the same amount.

I have considered the content of the FEIS and the many comments, letters and discussions received from the general public, other agencies, various interest groups and from my staff and the Interdisciplinary (ID) team in reaching my decision.

My objective in reaching this decision was to select a cost-effective, environmentally sound, socially acceptable alternative that would reasonably achieve the purpose and needs for the project.

All action alternatives will accomplish the Purpose and Need to some degree. Each recognizes the need to achieve healthy and sustainable forested and nonforested ecosystem components. The alternatives vary in their selection of treatment units, treatment prescriptions, and responsiveness to key issues.

The no action alternative, although preferred by many individuals, does nothing to achieve the desired resource conditions for the overall landscape.

I chose Alternative E because it best satisfied the strong public concerns to avoid impacts to the Camas Creek, Cayuse Mountain, and Irish Gulch Roadless Areas. Of the public comments received during the analysis, the preference for avoiding any impact to the roadless areas was expressed far more than any other concern. Alternative E, as analyzed in the FEIS, was the only alternative designed to avoid any harvest, burning, or road construction within the three roadless areas.

The other features of the alternative that most favorably impressed me were the acres of forested vegetation treated (2,524 acres harvest; 740 acres burn) and the cost effectiveness ($1.25 returned for each $1.00 invested) of the proposed timber harvest. An estimated 10.1 million board feet of commercial timber would be sold.

I was concerned, however, with the removal of any existing old growth and the potential for further aggravating the marginal watershed conditions in the Vermont/Priest/Long watershed and Beaver Gulch. By eliminating unit E7 and avoiding small patches of old growth identified in six other units we can avoid any loss of old growth. The elimination of units E14, E26, E27, E29, E34, and a major portion of E22, and changing the treatment prescriptions for units E15, E20 and E23 will reduce water yields to acceptable levels.

Although Units E1 and E44 were erroneously included in Alternative E, I am including E44 in the implementation decision. This is a grass site where small conifers have unnaturally invaded the site. Prescribed fire will be used to remove the invading conifers and restore the area to a productive grassland habitat. The need to treat Unit E1 is not urgent and will be deferred from treatment during this entry.

The weakest feature of the alternative was the low acreage of grassland habitats proposed for restoration treatments. With the addition of units C31, C41, C42, F44, F45, F46, F47, F48, F49 and F50 we can treat an additional 1,669 acres of grasslands. All of the units are within roadless areas (Camas - 244 acres; Cayuse - 721 acres; Irish - 704 acres) but I believe the effects on the roadless character will be minor and short term.

I also felt the alternative was deficient in the number of acres treated in the warm/dry Douglas-fir types. By adding prescribe burn units C29, F16, F17, F18 and F19 we will treat an additional 860 acres. Units F16-19 are within the Irish Gulch Roadless Area. Once burning is done on these units they should appear to be natural burns. Therefore, I think the impacts to the roadless character will be minimal and temporary.

Units C20, C26 and C27 are forested areas with a high degree of dead stems in the stands. This dead component is still merchantable and, unless salvaged soon, will become unusable. I included these harvest units into the decision because I believe there is an urgent need to initiate restoration of the stands and the opportunity to do so will soon be lost. Units C20 (322 acres) and C26 (95 acres) are within the Cayuse Mountain Roadless Area. A shelterwood harvest will be employed on 280 acres. The remaining 137 acres will be a seed tree prescription. Approximately three miles of temporary road will be needed to access the two units. The roads will be closed after the salvage is completed with a combination of physical barriers (slash placement and earthen barriers) and recontouring of the roadway. Unit C27 is adjacent to, but not within, the roadless area. The road construction and salvage logging will noticeably affect the roadless character of about 2,000 acres of the Cayuse Roadless Area. However, most of the affected acres have already been

impacted from past logging and road construction and the roadless area will still contain about 18,000 acres that are not affected.

Units E2, E3, E4 and E5 are harvest units in the Slough Creek area. Unit D11 is a 245 acre harvest unit in the same area. Dropping Units E2-E5 and substituting Unit D11 for them permits concentrating treatments in a manner that reduces habitat fragmentation and road construction and increases the cost effectiveness of the timber harvest.

Alternative E, as modified, will harvest 2,485 acres and prescribe burn 1,602 forested acres and 2,446 grassland acres. Harvest prescriptions include 105 acres of clearcut, 805 acres of seed tree, 704 acres of shelterwood, 409 acres of selection and 462 acres of thinning. The projected volume of commercial timber is 7.4 million board feet. The benefit:cost ratio calculated for the timber harvest is a very favorable $1.33 return for each $1.00 invested.

This project qualifies as a salvage timber sale. Salvage of timber killed by winter injury and subsequent insect activity is an important reason for entering the area. Also, other trees are being harvested or burned to create a condition of less stress for moisture and nutrients within the stand and to alter structure and density so that the stands will be less susceptible over time to significant insect or fire events. I also believe these treatments will also return these stands to a condition more similar to the range of historic conditions and, thus, restore ecosystem processes.

About 553 acres of prescribed burning is planned on lands suitable for timber production (T-1 and T-5). The four units involved are in need of treatment to reduce the stocking levels to natural conditions and burning is more economical and less disturbing than timber harvest.

In addition, about 494 acres of L-1, L-2 and M-1 lands (unsuitable for timber production) are treated with commercial timber harvest. In each case, silvicultural practices are the most practical means of achieving the desired conditions for these management areas.

About 40 percent of the proposed timber harvest units exceed 40 acres in size. The findings of the Big Belt Landscape Analysis clearly revealed that historic processes created natural patch sizes in excess of 250 acres. In addition to more closely resembling natural patch sizes the larger treatment areas reduce impacts to wildlife security and visual characteristics by reducing fragmentation from roads and treatment units, more effectively reduces unnatural fuel levels, provides greater efficiency with the road system, extends recovery period after treatments, and permits more effective treatment of large areas of recent mortality.

The following table summarizes the treatment units contained in the decision.

SELECTED ALTERNATIVE

ALTERNATIVE E - AS MODIFIED

		ACRES					
UNIT	**VEG TYPE**	**GROSS**	**NET**	**ROADLESS AREA**	**PRESCRIPTION**	**METHOD**	**MGT AREA**
E6	COOL/WET DF	26 25	19 19		SEED TREE CLEARCUT	TRACTOR TRACTOR	M-1
E8	LODGEPOLE	23	23		SEED TREE	TRACTOR	T-1
E9	COOL/WET/DF	60	45		SHELTERWOOD	TRACTOR	T-1

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
E10	LODGEPOLE COOL/WET DF	63	47		SEED TREE	TRACTOR	T-1
E11	COOL/WET DF	150	112		THIN	TRACTOR	T-1
E12	COOL/WET DF	235	176		THIN	TRACTOR	T-1
E13	WARM/DRY DF	93	84		SELECTION	TRACTOR	M-1
E15	LODGEPOLE COOL/WET DF	77	58		THIN	TRACTOR	T-1
E16	COOL/WET DF	53	40		SEED TREE	CABLE	T-1
E17	WARM/DRY DF	43	39		SELECTION	TRACTOR	T-1
E18	COOL/WET DF	63	47		SHELTERWOOD	TRACTOR	T-1
E19	LODGEPOLE COOL/WET DF	238	178		SHELTERWOOD	TRACTOR	T-1
E20	WARM/DRY DF	90 64	81 58		SELECTION TIMBER BURN	CABLE	T-1
E21	LODGEPOLE COOL/WET DF	67	50		SEED TREE	CABLE	T-1
E22	COOL/WET DF	50	45		TIMBER BURN		T-1
E23	WARM/DRY DF	80	79		TIMBER BURN		L-1
E24	COOL/WET DF	73	55		SHELTERWOOD	TRACTOR	T-1
E25	WARM/DRY DF	71	64		TIMBER BURN		L-1
E28	COOL/WET DF	139	104		SHELTERWOOD	TRACTOR/CABLE	T-1
E30	WARM/DRY DF	223	201		TIMBER BURN		T-1
E31	WARM/DRY DF	50	45		SELECTION	TRACTOR	T-5
E32	WARM/DRY DF	113 216	100 196		SEED TREE TIMBER BURN	TRACTOR	T-5
E35	WARM/DRY DF	10 38	10 34		SELECTION TIMBER BURN	TRACTOR	L-1
E36	WARM/DRY DF	11	11		SHELTERWOOD	TRACTOR	T-5
E37	GRASS	43	39		GRASS BURN		L-1
E38	GRASS	54	49		GRASS BURN		L-2
E39	GRASS	54	49		GRASS BURN		T-1
E40	GRASS	106	95		GRASS BURN		T-1
E41	GRASS	151	136		GRASS BURN		L-1
E42	GRASS	64	58		GRASS BURN		T-5

UNIT	VEG TYPE	GROSS	NET	ROADLESS AREA	PRESCRIPTION	METHOD	MGT AREA
E43	GRASS	305	275		GRASS BURN		L-1
E46	WARM/DRY DF	43	39		SELECTION	TRACTOR	T-1
C20	LODGEPOLE COOL/WET DF	42 280	32 210	CAYUSE	SHELTERWOOD SEED TREE	TRACTOR CABLE	T-1
C26	LODGEPOLE COOL/WET DF	95	71	CAYUSE	SEED TREE	TRACTOR	L-1
C27	LODGEPOLE COOL/WET DF	78	58		SHELTERWOOD	TRACTOR	T-5
C29	WARM/DRY DF	84	76		TIMBER BURN		L-1
C31	GRASS	244	220	CAMAS	GRASS BURN		L-1
C41	GRASS	388	349	CAYUSE	GRASS BURN		W-2
C42	GRASS	333	300	CAYUSE	GRASS BURN		L-1
D11	WARM/DRY DF LODGEPOLE COOL/WET DF	80 80 85	72 61 65		SELECTION CLEARCUT SEED TREE	TRACTOR CABLE TRACTOR	M-1
F16	WARM/DRY DR	66	59	IRISH	TIMBER BURN		L-1
F17	WARM/DRY DF	48	36	IRISH	TIMBER BURN		W-2
F18	WARM/DRY DF	621	541	IRISH	TIMBER BURN		W-2
F19	WARM/DRY DF	41	31	IRISH	TIMBER BURN		W-2
F48	GRASS	66	59	IRISH	GRASS BURN		W-2
F45	GRASS	42	38	IRISH	GRASS BURN		W-2
F46	GRASS	53	48	IRISH	GRASS BURN		W-2
F47	GRASS	102	92	IRISH	GRASS BURN		L-2
F48	GRASS	269	242	IRISH	GRASS BURN		L-2
F49	GRASS	96	86	IRISH	GRASS BURN		L-2
F50	GRASS	76	68	IRISH	GRASS BURN		W-2

This project is designed to treat enough acres over the implementation area to avoid the need for any more scheduled treatments for the next 25 years. Unless roads needed for this project are needed for other purposes during the next 25 years they will be physically closed or reclaimed to prevent administrative and public use. Changes in long term transportation management, including the need for additional road closures, may be determined for the National Forest lands in the Big Belt Mountains within the next couple of years. Such needs and decisions are, of course, outside the scope of this decision.

Approximately 12 miles of new roads would be build with this alternative. All of these roads will be closed after they are no longer needed for this project. While I totally support the closures I am concerned that we design the most cost effective closures that effectively provide for wildlife security and facilitate watershed recovery. They will be closed by a combination

of placing slash and debris in the roadway, installation of earthen barriers and recontouring the roadway. Recontouring will be favored where adequate soil is available, slopes do not exceed 40 percent, ground disturbance from recontouring will not increase risk of weed invasion, and the road prism will not be needed for the next 25 years. Physical barriers will be used where it is impractical to recontour. Specifically, the following activities will occur:

- Long Gulch - Close all new roads after burning.

- Ridge west of Ohio - Close roads to units E8-10 after burning is completed.

- Road to Unit E11 - Close immediately after slashing is completed.

- Beaver Creek - Close road to Unit 32 after slash piling is completed.

- Slough Creek - Close roads to units E2 and E3 after slash piling is completed. Roads to units E5 and E6 will be recontoured after burning is completed.

Implementation will also require approximately 10 miles of road reconstruction. All roads in the Long Gulch area would be closed, eliminating motorized access to the public land in that area. Motorized access would be limited to the northern portion of Ohio Gulch. The permanent road closures of existing roads would total about 21 miles. The Alternative E map shows these road closures. Specifically the following activities will occur:

- Long Gulch - All roads will be closed using a combination of slash and debris placement in roadway, earthen barriers, and recontouring. Approximately eight miles will be closed.

- Ohio Gulch - The lower one mile of road from Benton Gulch will remain open. The remaining roads will be permanently closed and revegetated.

- Atlanta Creek (south of system roads) - Close with earthen barriers and revegetate to grasses. On primitive roads, close using a combination of recontouring and physical barriers.

Approximately 14.5 miles of existing road will be closed on a year-round basis. The closing of these roads will result in a decrease in open road density within the implementation area from 0.98 to 0.72 miles per square mile. Although this open road density continues to exceed the Forest Plan Standard of 0.1 miles per square mile, I am satisfied that the roads selected for closure will improve the amount and distribution of security areas for big game. Elk security within the Thomas Benton Elk Herd Unit will increase from 31 to 33 percent. Within the Implementation Area specifically, the security will increase from 21 to 31 percent. More importantly, the big game security within the Implementation Area will be better distributed. Security in the northern portion of the implementation will increase from 7 percent to 29 percent of the total security in the Implementation Area. Consequently, I have approved a site specific exception to the open road density standard for this project.

Monitoring commitments to be conducted include:

All timber harvest and road construction would be monitored by Forest Service representatives to ensure compliance with contractual requirements.

Best Management Practices (BMPs) will be monitored by sale administrators, engineering representatives and resource specialists to assure that BMPs are implemented, as planned, and achieving anticipated effectiveness.

The kind, amount, and distribution of soil disturbance will be measured and assessed against Agency soil quality standards, site preparation specifications, applicable BMPs, and Forest Plan standards and guidelines.

Water quality monitoring at the Atlanta Creek monitoring station will continue. The monitoring site was established in 1983.

Changes in stream channel morphology in the Vermont/Long Gulch watershed will be determined by establishment of at least one permanent cross section in Vermont Creek.

Track counts of elk, deer, marten, lynx and wolverine will be conducted for five years after implementation to assess the effectiveness of road closures in maintaining habitat security for these species.

Fishery response to changes in sediment yield in Atlanta and Vermont Creek will be monitored on identified critical reaches.

The rate of plant recovery and livestock use on units treated by prescribed burning will be monitored annually.

Regeneration surveys will be conducted on planted treatment units and natural regeneration units to determine restocking success on forested treatment units.

Views from sensitive viewing areas, Trails 236 and 258 A-1, and Road 287 A-1 will be evaluated during harvest activities to determine if anticipated visual screening was achieved and road and trail disturbance avoided.

Treatment areas adjacent to inventoried roadless areas will be reviewed prior to sale advertisement to assure that unplanned entries into roadless areas are avoided.

Changes in livestock use patterns due to harvest unit openings and changes in road access will be determined and needs identified for fences or other barriers to reduce any unexpected disturbance from livestock use.

All roads and harvest units will be inspected annually for noxious weed infestations to determine treatment needs.

All burn treatments will be evaluated to determine if expected results were achieved.

Rate of recovery, species composition changes, and changes in production will be determined from establishment of transects and photo points in a representative timber underburn, aspen, and grassland treatment unit.

K-V funds, where appropriate, will be used to finance monitoring if funds are available. If K-V funds are not available the work will be financed from other appropriate project funds.

III. PUBLIC INVOLVEMENT

I initiated formal scoping for the EIS with the publication of the Notice of Intent to Prepare an Environmental Impact Statement (NOI) in the Federal Register on July 20, 1993. The NOI presented a summary of the Proposed Action, the purpose and need for the action, tentative environmental issues and other supplementary information. It also expressed the importance of public participation and input, particularly during the initial scoping period and later during the period provided for comment on the DEIS.

News releases were printed in three local newspapers during the month of July. They included the *Independent Record* (july 17, 1993), the *Townsend Star* (July 15, 1993) and the *Meagher County News* (July 15, 1993).

Public input was also solicited at three Open Houses. Four people attended the July 20, 1993 meeting at Townsend, five people attended the July 21, 1993 meeting at the Kings Hill Ranger District in White Sulphur Springs, and six people attended the July 22, 1993 meeting at the Forest Supervisor's Office in Helena, Montana. Those attending represented a wide range of interests. Oral and written comments were received both during and after the Open Houses. These comments are available for review in the Project File.

All comments received prior to September 9, 1993, were used to identify issues for the DEIS.

Invitations were sent to more than 50 individuals and groups to participate in field trips to the Implementation Area. News releases were also published in the Helena, townsend and White Sulphur Springs newspapers to invite interested parties. Public field trips were held on October 5 and November 2, 1994. A total of 16 individuals, representing the following organization and agencies participated:

Last Chance Audubon Society	MT Environmental Protection Agency
Public Forestry Foundation	Native Ecosystem Council
Sierra Club	Patagonia Environmental Program
Ecology Center	Alliance for the Wild Rockies
Meagher County Weed Board	American Wildlands
Townsend area tree farmer	White Sulphur Springs area ranchers

The Helena National Forest wanted to hear public comments to validate that issues and been adequately identified and the range of alternatives were responsive to the issues, in addition to acquainting participants with the status of the project. Meeting notes of these field trips are contained in the Project File.

Comments were received from 42 individuals, organizations, and agencies in response to the DEIS. The comments received were analyzed and categorized for response. A summary of the comments and responses to them is contained in Chapter V of this document. Copies of all comments are available for review in the project file.

An Environmental Impact Statement Availability Notice appeared in the Federal Register on February 3, 1995 notifying the public that the DEIS for the Wagner/Atlanta Vegetation Treatment Project was available and the comment period would end on March 20, 1995. Three public meetings were held; February 14 in Townsend, February 15 in White Sulphur and February 16 in Helena.

IV. ALTERNATIVES CONSIDERED

Five alternatives were studied in detail in the Final EIS. The alternatives are site-specific to unit and road location. These alternatives are all in conformance with the Forest Plan (36 CFR 219.10(e)).

Alternative A

Alternative A is the original action described in Chapter 1 of the FEIS and is the action for which public comment was sought.

Implementation would require construction of approximately 17.3 miles of temporary road and reconstruction of 9.6 miles of existing road. All new roads would be obliterated and returned to natural contour after treatments are completed. Approximately 9.5 miles of the new construction are included within the Cayuse Mountain (3.4 miles), Irish Gulch (4.2 miles) and Camas Creek (1.9 miles) Roadless Areas. Closures of existing roads are proposed on 1.2 miles in Irish Gulch and 0.64 miles in the Camas Creek Roadless Area.

Alternative B

Under this alternative, none of the actions identified in the Proposed Action would occur. This alternative responds to the concerns that oppose any additional vegetative manipulation or road construction in the Implementation Area and provides a baseline to compare the amount and rate of change of each of the action alternatives.

Alternative C

Alternative C was designed to meet the purpose and need while addressing internal and public concerns of elk vulnerability during the hunting season (Issue 1). In addition, it addresses forest health by treating some stands with heavy mortality. Treatment areas and road construction and existing road closures are located and designed to increase the level of security for the affected elk herd unit during the big game hunting season.

For Alternative C, approximately 9.0 miles of road construction and 7.0 miles of road reconstruction would be needed and no new roads are proposed within either the Cayuse or Irish Gulch Roadless Areas. An estimated 1.2 miles of temporary road would be needed in the Camas Creek Roadless Area. All new roads would be closed to motorized use after project implementation is completed. About 22 miles of existing roads will be closed yearlong and 11 miles will be closed during hunting season. Closures of existing roads in the Roadless Areas are proposed in Cayuse (0.4 miles), Irish Gulch (4.3 miles) and Camas Creek (5.9 miles).

Alternative D

Alternative D was developed to respond to concerns expressed for maximizing monetary returns of project implementation (issue 2). The alternative was developed to treat total acres comparable to the acres contained in the Proposed Action. To maximize monetary returns, the alternative treats those forested stands that provide the greatest monetary returns, and the least cost for implementing. Stands proposed for harvest are generally capable of regeneration by means of tractor yarding and dozer slash treatment and site preparation. Stands requiring hand planting, broadcast burning, yarding and other costly features are not favored in this alternative.

Non-forested acres selected for burning treatment were identified as areas most in need of treatment to increase production and vigor and are reasonably accessible for treatment.

Implementation of Alternative D would require construction of 25.6 miles of road and reconstruction of 15.0 miles of existing road. Construction of 17.9 miles of temporary roads would be required in the Cayuse (4.8 miles), Irish Gulch (7.9 miles) and Camas Creek (5.2 miles) Roadless Areas. About 1.1 miles of existing road in the Cayuse Roadless Area and 4.4 miles of existing road in the Long Gulch and Ohio Gulch areas would be permanently closed. An additional 7.0 miles of road 4161 will be closed during hunting season.

Alternative E:

Alternative E responds to those concerns for avoiding impacts to inventoried roadless areas (Issue 3). No roading or vegetative treatments are proposed within the Roadless Areas. Treatments were selected outside of the roadless areas with an attempt to still achieve the target acres determined for the Implementation Area and designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands.

Areas treated by silvicultural prescription would leave 20-30 percent of the total treatment area in stand reserves. Stands would be regenerated by approximately 138 acres of planting and 1861 acres of natural regeneration. Areas to be treated are more concentrated and there is a reduction of the number of acres to be treated.

Approximately 14.8 miles of road construction and 14.5 miles of reconstruction would be needed to implement this alternative. An estimated 14.5 miles of existing roads would be closed yearlong in the Wagner Gulch, long Gulch, Ohio Gulch, and Atlanta Creek areas. An additional 7 miles of Road 4161 will be closed to motorized vehicles during hunting season.

Alternative F

This alternative treats only those areas that do not require new road construction. It responds to those concerns expressing opposition to any new road construction (Issue 4). Helicopter yarding is proposed for stands needing treatment that are

within 7000 feet of existing roads and not accessible by conventional wheel, track, or cable harvest systems. Stands not accessible from existing roads or helicopter yarding are not considered available for treatment with this alternative.

Prescriptions were designed to restore forested areas to historical stand structure and to reintroduce fire to grasslands where the exclusion of fire has permitted conifer invasion of natural grasslands. Untreated reserve patches would represent 20-30 percent of treatment areas. Stands would be regenerated by natural regeneration of approximately 2717 acres.

No road construction is planned. Reconstruction of about 8.6 miles of existing road would be needed. About 14 miles of existing roads would be closed to motorized uses yearlong in the Wagner Gulch, Ohio Gulch and Atlanta Creek areas. An additional 7 miles of road 4161 will be closed during hunting season.

V. COMPLIANCE WITH FOREST PLAN DIRECTION

The selected alternative is in compliance with management direction established for the area in the Helena National Forest Plan. The proposed action would occur in Management Areas T-1, T-5, L-1, L-2, M-2 and W-2.

Timber management and prescribed fire practices were analyzed to ensure their consistency with Management Area Goals and Standards and applicable Forest-wide Management Standards (see Forest Plan, pages III/30 to III/46 and II/1 to II/36). In reviewing the suitability for management practices in the Wagner/Atlanta project area, the ID Team found that on-the-ground conditions fit with management practices identified in the Forest Plan (36 CFR 219.12(K)).

The alternative was also consistent with all other Forest Plan Standards except open road density and opening sizes. I have granted an exception to the open road density standard as permitted by the Helena Forest Plan. Regional Forester approval has been granted for exceeding the 40 acre opening restriction.

VI. COMPLIANCE WITH CURRENT LAWS AND REGULATIONS

Tiering to Forest Plan - I consider the Wagner/Atlanta Vegetation Final EIS is appropriately tiered under the guidelines and direction of the Helena Forest Plan and Final EIS (Forest Plan, page I/1, Introduction - Relationship to Other Documents) and as prescribed under the National Environmental Policy Act 40 CFR 1502.20.

Land and Resource Management Planning - I have determined that the project is responsive to applicable current laws and regulations guiding the planning and management of National Forest lands.

National Environmental Policy Act - The NEPA provisions have been followed as required under 40 CFR 1500. The Wagner/Atlanta Vegetation EIS and this Record of Decision comply with the intent and requirements of the NEPA. The EIS analyzes an acceptable range of alternatives, including a "No-Action" alternative. It also discloses the expected impacts of each alternative, and discusses the identified and concerns. This document described the decision I have made and my rationale for making that decision.

Suitability for Timber Management - I have determined that the lands scheduled for timber harvest under the selected alternative are suitable for timber production in accordance with 36 CFR 219.14, and are part of the lands classified as suitable in Appendix G of the Forest Plan. In addition, management areas L-1, L-2 and M-1 will be treated with timber harvest to meet Management Area Goals and Objectives.

Even-aged Management - I have reviewed the *Timber Stand Diagnosis* and agree with the silvicultural recommendations that even-aged management of the timber stands under the selected alternative is appropriate to meet the objectives and requirements for Management Areas T-1, T-2, T-5 L-1, L-2 and M-1 as described in the Forest Plan.

Vegetative Manipulation - The selected alternative complies with the requirements under 36 CFR 219.27(b) in regard to altering vegetative tree cover. Applicable rationale/references include the following:

- After comparing the expected environmental consequences of the various alternatives (FEIS Chapter IV) I believe that the selected action initiates Forest Plan direction and meets the multiple-use goads established for the area

- the silviculture treatments diagnosed for the selected alternative are fully expected to result in adequate restocking of desirable trees in five years

- an economic analysis was prepared and considered. The selected alternative has the highest projected long-term economic return and has a positive cash flow

- the use of Best Management Practices (Appendix B, FEIS), the avoidance of problem soil areas, the regulation of yarding/site preparation operations, and the application of mitigation measures required by this document will ensure that site productivity is maintained, and that soil erosion is minimized and State Water Quality standards are met.

- implementation of the selected alternative will result in timber management practices which are appropriate for Management AReas T-1, T-2 and T-5 as described in the Forest Plan. The selected alternative will also have acceptable effects on the wildlife resource by maintaining near the existing level of hiding cover and acceptable effects on the soils, water, visual and other resources within the assessment area. Timber Management practices on M-1, L-1 and L-2 will accomplish goals and objectives in the Forest Plan.

- data presented in the Final EIS relative to transportation, economics, and silvicultural treatments indicate that timber management is feasible and practical over the long-term.

<u>Prescribed Fire Activities</u> - Implementation of the selected alternative will result in prescribed fire practices which are appropriate for Management Areas T-1, T-5, L-1, L-2 and W-2 as described in the Forest Plan.

<u>Endangered Species Act</u> - This decision meets all requirements of the Endangered Species Act. The United States Fish and Wildlife Service has concurred with the determination of effects on threatened and endangered species.

<u>National Historical Preservation Act</u> - The project area contains several historic sites that will be protected. The compliance process, as outlined in 36 CFR 800, has been initiated. If additional sites are identified as final road locations and cutting unit boundaries are examined, appropriate mitigation measures as recommended by the Forest archaeologist will be incorporated into the final project design to assure full compliance with the intent and requirements of the National Historic Preservation Act.

<u>Additional Laws and Regulations</u> - To the best of my knowledge, the proposed action is within all other applicable laws and regulations. There are no known threatened or endangered plants or animals within the project area. Water and air quality standards will be met. There are no classified floodplains or wetlands within the project area.

VII. IDENTIFICATION OF ENVIRONMENTALLY PREFERRED ALTERNATIVE

Alternative E is the environmentally preferred alternative. Implementation of this alternative would allow for treatment of insect infested and diseased timber to promote long-term forest health, convert slow growing and insect and disease susceptible timber stands to healthy, young timber stands and provide visual rehabilitation of previously harvested units. Mitigation measures protect soil and water resources and important wildlife habitat.

The environmental effects of implementing the modified Alternative E are acceptable when viewed in context of the goals and objectives described in the Forest Plan. All practicable means to avoid or minimize environmental harm from the selected alternative have been adopted.

VIII. PLANNING RECORDS

The project file contains detailed information and data used in preparation of the Wagner/Atlanta Vegetation Treatment Final Environmental Impact Statement and in selecting Alternative E with modification, for implementation. The Project File is maintained at:

Helena National Forest Headquarters
2880 Skyway Drive
Helena, MT 59601
(406) 449-5201

IX. APPEAL PROVISIONS AND IMPLEMENTATION

This decision is subject to appeal pursuant to 36 CFR 215.7. As stated in 36 CFR 215.11, an appeal may be filed by any person or non-federal organization or entity that has submitted comment, or otherwise expressed interest in this proposal. A written appeal must be submitted within 45 days after the date of publication of this decision in the Independent Record, Helena, Montana to:

USDA - Forest Service, Northern Region
Attn: Appeals Deciding Officer (RFO)
PO Box 7669
Missoula, MT 59807

Appeals must meet content requirements of 36 CFR 215.14. Detailed records of the environmental analysis are available for public review at the Helena Supervisors Office, 2880 Skyway Drive, Helena, Montana 59601 and the Townsend Ranger District, 415 South Front Street, Townsend, Montana 59644. For further information on this decision, contact George Weldon, District Ranger, Townsend Ranger District.

If no appeal is received, implementation of this decision may occur on, but not before, 5 business days from the close of the appeal filing period. If an appeal is received, implementation may not occur for 15 days following the date of appeal disposition.

THOMAS J. CLIFFORD
Forest Supervisor
Helena National Forest

July 19, 1995
Date

WAGNER-ATLANTA VEGETATION TREATMENT FEIS

ERRATA SHEET

JUNE 1995

This document identifies and corrects errors contained within the Final Environmental Impact Statement published in June, 1995. The corrections specified in this document supersede the previous FEIS.

SUMMARY

Page Summary - 11

Last paragraph; first sentence reads:
Alternatives A, E, and F treat approximately the same number of forested acres; 3,386, 3,324 and 3,492, respectively.

Corrected reads:
Alternatives A, E, and F treat approximately the same number of forested acres; 3,386, 3,264 and 3,492, respectively.

Page Summary - 12

Second paragraph reads:
Alternative C proposes treatment of the fewest forested acres, 2,849, but treats 2,507 acres of grasslands.

Corrected reads:
Alternative C proposes treatment of the fewest forested acres, 2,869, but treats 2,507 acres of grasslands.

Pages Summary - 13/14

TABLE S-1 contains errors for Issue II - Economics and Issue V - Forest Health. Correction replaces the table with the following table.

TABLE S-1 COMPARISON OF ISSUES BY ALTERNATIVE

	ALTERNATIVES					
COMPARISON ELEMENT	**A**	**B**	**C**	**D**	**E**	**F**
ISSUE I - Elk Vulnerability						
Miles open road	79	81	49	69	60	60
ORD (Mi/Mi^2)	.96	.98	.59	.83	.72	.72
HC maintained (%)	34	36	35	34	34	35
Security Area (%)	31	31	36	27	33	31
ISSUE II - Economics						
Acres harvested	2245	0	1911	2924	2524	3274
Volume (MMBF)	9.0	0	6.3	12.2	10.1	11.2
Gross receipts ($M)	2,700	0	1,890	3,660	3,030	3,360
B/C ratio	1.07	NA	0.66	1.30	1.25	0.72
PNV (M$)	8.5	NA	-1,068.0	696.9	427.7	-1,321.5

COMPARISON ELEMENT	A	B	C	D	E	F
ISSUE III - Roadless						
Cayuse Gulch 19353						
Acres harvested	222	0	473	147	0	158
Acres burned	891	0	1055	141	38	846
Acres affected	1191	520	2273	917	520	646
Acres unaffected	18162	18833	17080	18436	18833	18707
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	13.6	13.6	13.6	13.6	13.6	13.6
New roads	3.4	0	0	4.8	0	0
Existing rds. closed	0	0	.4	1.1	0	0
Irish Gulch 7,787						
Acres harvested	208	0	74	238	0	736
Acres burned	1232	0	938	590	0	664
Acres affected	2768	320	394	1258	320	7787
Acres unaffected	5019	7467	7393	6529	7467	0
Wilderness eligibility	NO	YES	YES	YES	YES	NO
Existing roads	6.2	6.2	6.2	6.2	6.2	6.2
New roads	4.2	0	0	7.9	0	0
Existing rds. closed	1.2	0	4.3	0	0	0
Camas Cr. 28,832						
Acres harvested	304	0	194	529	0	159
Acres burned	569	0	474	590	97	402
Acres affected	2639	2335	1609	3759	915	2399
Acres unaffected	26193	26497	27223	25073	27917	26433
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	16	16	16	16	16	16
New roads	1.9	0	1.2	6.7	0	0
Existing rds. closed	.64	0	5.9	0	0	0
ISSUE IV - Roads						
Miles new construction	17.3	0	9.0	25.6	14.8	0
Miles reconstruction	9.6	0	7.0	15.0	14.5	8.6
Miles new roads closed	17.3	0	9.0	25.6	14.8	0
Miles existing roads closed						
Yearlong	1.8	0	21.0	5.5	14.5	14.0
Seasonal	0	0	11.0	7.0	7.0	7.0
ISSUE V - Forest Health						
Acres treated Total	6299	0	5376	4406	4079	5956
Clearcut	423	0	150	492	52	209
Seed tree	102	0	198	1125	626	1256
Shelterwood	821	0	1027	399	746	371
Commercial thin	0	0	177	252	385	0
Selection	899	0	359	656	715	1438
Forested burn	1141	0	958	80	740	218
Grasslands burned	2913	0	2507	1402	815	2464
Acres dead forests regenerated	0		566	272	329	181
Acres insect and diseased forest treated	1970	0	1192	1752	1767	2093
Acres Old Growth removed						
Existing	96	0	0	70	106	118
Potential	0	0	0	0	0	0
Acres Old Growth remaining						
Existing	1364	1460	1460	1390	1354	1342
Potential	794	794	794	794	794	794

CHAPTER II - ALTERNATIVES

Page Chapter II - 17	MAP II-2 does not identify Unit C5. This is a 15 acre clearcut and erroneously included in Unit C6.
Page Chapter II - 21	MAP II-3 displays Unit D54 as a seed tree treatment. Unit should be shown as a grass burn.
Pages Chapter II - 22, 24	Units E1 and E44 (grass burns) are within the Camas and Cayuse Roadless areas, respectively. The intent of the alternative was to avoid all treatments within inventoried roadless areas but these units were inadvertently included in the alternative.
Page Chapter II - 25	Map II-4 indicates that Units E5, E28 and E38 are partially located in roadless areas. Intent was to locate boundaries to stay outside roadless area.
Page Chapter II - 29	Map II-5 does not label Unit F55 in the extreme northern portion of the Implementation Area.
Page Chapter II - 32	Last paragraph; first sentence reads: Alternatives A, E, and F treat approximately the same number of forested acres; 3,386, 3,324 and 3,492, respectively. Corrected reads: Alternatives A, E, and F treat approximately the same number of forested acres; 3,386, 3,264 and 3,492, respectively.
Page Chapter II - 33	Second paragraph reads: Alternative C proposes treatment of the fewest forested acres, 2,849, but treats 2,507 acres of grasslands. Corrected reads: Alternative C proposes treatment of the fewest forested acres, 2,869, but treats 2,507 acres of grasslands.
Page Chapter II - 34/35	TABLE II-6 contains errors for Issue II - Economics, Issue III - Roadless, and Issue V - Forest Health. Correction replaces the table with the following table.

TABLE II-6 COMPARISON OF ISSUES BY ALTERNATIVE

	ALTERNATIVES					
COMPARISON ELEMENT	A	B	C	D	E	F
ISSUE I - Elk Vulnerability						
Miles open road	79	81	49	69	60	60
ORD (Mi/Mi²)	.96	.98	.59	.83	.72	.72
HC maintained (%)	34	36	35	34	34	35
Security Area (%)	31	31	36	27	33	31
ISSUE II - Economics						
Acres harvested	2245	0	1911	2924	2524	3274
Volume (MMBF)	9.0	0	6.3	12.2	10.1	11.2
Gross receipts ($M)	2,700	0	1,890	3,660	3,030	3,360
B/C ratio	1.07	NA	0.66	1.30	1.25	0.72
PNV (M$)	8.5	NA	-1,068.0	696.9	427.7	-1,321.5

COMPARISON ELEMENT	A	B	C	D	E	F
ISSUE III - Roadless						
Cayuse Gulch 19353						
Acres harvested	222	0	473	147	0	158
Acres burned	891	0	1055	141	38	846
Acres affected	1191	520	2273	917	520	646
Acres unaffected	18162	18833	17080	18436	18833	18707
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	13.6	13.6	13.6	13.6	13.6	13.6
New roads	3.4	0	0	4.8	0	0
Existing rds. closed	0	0	.4	1.1	0	0
Irish Gulch 7,787						
Acres harvested	208	0	74	238	0	736
Acres burned	1232	0	938	590	0	664
Acres affected	2768	320	394	1258	320	7787
Acres unaffected	5019	7467	7393	6529	7467	0
Wilderness eligibility	NO	YES	YES	YES	YES	NO
Existing roads	6.2	6.2	6.2	6.2	6.2	6.2
New roads	4.2	0	0	7.9	0	0
Existing rds. closed	1.2	0	4.3	0	0	0
Camas Cr. 28,832						
Acres harvested	304	0	194	529	0	159
Acres burned	569	0	474	590	97	402
Acres affected	2639	2335	1609	3759	915	2399
Acres unaffected	26193	26497	27223	25073	27917	26433
Wilderness eligibility	YES	YES	YES	YES	YES	YES
Existing roads	16	16	16	16	16	16
New roads	1.9	0	1.2	6.7	0	0
Existing rds. closed	.64	0	5.9	0	0	0
ISSUE IV - Roads						
Miles new construction	17.3	0	9.0	25.6	14.8	0
Miles reconstruction	9.6	0	7.0	15.0	14.5	8.6
Miles new roads closed	17.3	0	9.0	25.6	14.8	0
Miles existing roads closed						
Yearlong	1.8	0	21.0	5.5	14.5	14.0
Seasonal	0	0	11.0	7.0	7.0	7.0
ISSUE V - Forest Health						
Acres treated Total	6299	0	5376	4406	4079	5956
Clearcut	423	0	150	492	52	209
Seed tree	102	0	198	1125	626	1256
Shelterwood	821	0	1027	399	746	371
Commercial thin	0	0	177	252	385	0
Selection	899	0	359	656	715	1438
Forested burn	1141	0	958	80	740	218
Grasslands burned	2913	0	2507	1402	815	2464
Acres dead forests regenerated	0		566	272	329	181
Acres insect and diseased forest treated	1970	0	1192	1752	1767	2093
Acres Old Growth removed						
Existing	96	0	0	70	106	118
Potential	0	0	0	0	0	0
Acres Old Growth remaining						
Existing	1364	1460	1460	1390	1354	1342
Potential	794	794	794	794	794	794

CHAPTER IV - ENVIRONMENTAL CONSEQUENCES

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Effects for Alternative E reads:
There are no treatments proposed within the Roadless Areas with this alternative and thus no effects are associated with the Roadless Areas. However, there would be about 3.57 miles of existing roads closed between Mule Creek and Camas Ridge in the Camas Creek Roadless Area. With these road closures, the amount of unaffected acres would be increased to 27,917 acres with the elimination of this incursion.

Correction reads:
This alternative was designed with the intent of avoiding any treatments within the roadless areas. However, Units E1 (97 acre timber burn) and E44 (38 acre grass burn) are within the Camas and Cayuse Roadless Areas, respectively. Although the proposed treatments would not have any effect on the roadless character of the two areas, their inclusion in the alternative compromises the intent of the alternative. Elimination of the two units from Alternative E will effectively maintain the integrity of the alternative.

There would be about 3.57 miles of existing roads closed between Mule Creek and Camas Ridge in the Camas Creek Roadless Area. With these road closures, the amount of unaffected acres would be increased to 27,917 acres with the elimination of this incursion.

CHAPTER V - RESPONSE TO PUBLIC COMMENTS

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Response to the third comment on the page (letter 40); first sentence reads:
We will be destroying the roadless areas.

Correction reads:
We will not be destroying the roadless areas.

APPENDIX

Page A - 6

Statement relative to Ohio Gulch for Alternative E reads:
provide 1 mile of access from Benton, then treat same as in Alternative A.

Correction reads:
provide 1 mile of access from Benton, then treat same as in Alternative C.